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MEDICAL CASES AND
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Medical
CASES AND REMARKS.

ERRATA.

Page 20, line 11, for *ſulphris*, read *ſulphuris*.
—— 78, — 10, — *in ches*, —— *inches*.
—— 80, — 4, — *urgentâ*, —— *urgentê*.

MEDICAL CASES AND REMARKS.

PART I.

ON THE GOOD EFFECTS OF
SALIVATION
IN
JAUNDICE ARISING FROM CALCULI.

PART II.

ON THE FREE USE OF
NITRE
IN HÆMORRHAGY.

BY
THOMAS GIBBONS, M. D.

THE
Second Edition, with Additions.

Sudbury

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PREFACE.

THE Medical Commentaries have, with great reputation to the editor, gone through two decades. Since which, a new work, under the title of the Annals of Medicine, has been publiſhed. In the firſt volume of which, twelve caſes of biliary obſtructions from calculi, ſucceſſfully treated by ſalivation, are inſerted. Since that time, the author has been favoured with ſome communications on the ſubject, from his medical correſpondents, which further confirm the uſefulneſs of the practice: he therefore preſents this ſmall volume to the notice of the gentlemen of the faculty, wiſhing the trials made, may prove as ſucceſsful to them, as they have been to their humble ſervant

T. GIBBONS.

Hadleigh in Suffolk.

In addition to theſe caſes ſome medical obſervations are given, and inſtances related, where violent hæmorrhages from the lungs, ſtomach, and uterus, have been, almoſt immediately, reſtrained by large doſes of nitre.

Biliary obſtructions from gall ſtones are not only excruciatingly painful when a calculus has got ſo far into the duct as to prevent the bile from paſſing into the inteſtine, but, what are the melancholy effects? Not often inflammation indeed, but frequently indurations of the liver, ſchirri, and their ſucceſſors dropſies, and generally of that ſort which is the moſt fatal, aſcites.

Hippocrates, the founder of phyſic, lamented, though he lived to the age of an hundred years, that the art was long, life was ſhort! See his firſt aphoriſm.

Before I quitted practice I had reaſon to make the ſame complaint. There is always ſomething for an attentive obſerver to learn. When I firſt went into the practice of phyſic, many years ago, the diſorders of the time were then almoſt all of the inflammatory kind. Fevers gave way to bleeding and cooling remedies; and a favourable criſis generally took place about the ſeventh day. In thoſe caſes which proved fatal, a delirium came on about the ſeventh, and death cloſed the ſcene on the tenth or eleventh day. I have not ſeen a fever of this ſort for more than thirty years. The fevers of the preſent day are, I mean idiophatic fevers, almoſt all of the nervous remittent kind, tending to putrid. What is the cauſe of this? We now and then meet with an old ſtager in the farming way, (and who breathe better air than the farmers?) whoſe breakfaſt is bread and cheeſe, moiſtened with his own home brewed beer; his dinner pudding and pork, and, who drinks neither tea nor port wine, yet this man, though his exerciſe be ſufficient to procure a good digeſtion, is not free from the epidemic of the ſeaſon. May we not then, reaſonably ſuppoſe that theſe changes are owing to ſome occult cauſe in the air? If ſo, or from whatever cauſe they may ariſe, the phyſician has daily to learn: therefore, were I now in practice I ſhould not change the motto prefixed to my graduation theſis—*De Mulierum Mammis, et Morbis quibus obnoxiæ ſunt.*

——MISERIS SUCCURRERE DISCO.

PART I.

ON THE
GOOD EFFECTS OF SALIVATION
IN
JAUNDICE
ARISING FROM CALCULI.

IT has been acknowledged by the medical faculty, that there is nothing more difficult to account for than the modus operandi of remedies; and this may be obſerved both in their ſimple and compound forms. Why does ipecacuanha act upon the ſtomach, and jallap run to the bowels? What is the reaſon that large doſes of crude mercury may be taken with impunity? and why ſo ſmall a quantity, when joined with marine acid, prove ſo deleterious? On the other hand, why is the vitriolic acid ſo pernicious by itſelf, and why ſo mild when united to alkaline ſalt, or joined with inflammable matter? More queſtions concerning ſtimulants in the firſt paſſages might be aſked; but let theſe ſuffice. When medicines have entered the ſyſtem, whether by the lacteals or lymphatics, we are equally at a loſs to account for their action there. Why does calomel or mercurial ointment affect the ſalivary in preference to any other glands? Why does ferrum vitriolatum ſtimulate

late the uterus, and kali acetatum the kidneys? The anſwering of theſe queſtions I ſhall leave to thoſe gentlemen who may think themſelves more equal to it than I find myſelf.

Anatomy is now ſo well known to every medical man of any reputation, that I think a deſcription of the biliary organs needleſs; but ſhould it ſo happen, that a reader has not had an opportunity of attending to ſuch ſubjects, the reading of my worthy friend Dr. Thomas Coe's Treatiſe on Biliary Concretions, may be of uſe to him.

I have no noſtrum to vend, nor do I publiſh the following caſes to make myſelf known; for on account of ill health I have declined practice. My only motive is, becauſe I think they will be of uſe to mankind. Calomel has in biliary obſtructions frequently been given as a deobſtruent; but I do not recollect, that intended ſalivation for the removal of biliary calculi has ever been recommended. I know that in the Eaſt Indies it is a common practice, for inflammations of the liver, after bleeding, to ſalivate as quickly as poſſible; but this is foreign to my purpoſe. I ſhall therefore proceed to a relation of ſuch caſes as I have treated ſucceſsfully.

CASE I.

Mrs. Ward, a widow lady of this town, aged about ſeventy years, of a corpulent habit, ſent for me in May 1776. Her ſkin and urine were very yellow, her ſtools of a clay colour. She complained of acute pain from the pit of her ſtomach to her back, with frequent vomitings: her legs were much ſwelled, and pitted. I ordered her ſome pills of calomel, ſoap, rhubarb, and aloes, with anodynes occaſionally. I confeſs I did not order theſe medicines with an intention of ſalivating her, but as de-obſtruents. She had not, however, taken them many days before a ſpit-

ting

ting came on; and I obſerved, before ſhe had ſpit ſix days, which ſhe did to about the quantity of a pint in a day, that her jaundice gradually decreaſed, and the ſwelling of her legs went off; and ſhe was, after ſpitting about fourteen days, perfectly free from her diſorder, but her ſpitting continued ſo troubleſome, that it was neceſſary to check it, by frequently giving her lac ſulphris and nitre. She lived to the age of eighty, and never had any return of her jaundice. Her ſtools were examined, but no calculi found.

CASE II.

Mrs. Nelſon, an apothecary's widow at Manningtree in Eſſex, ſent for me about the latter end of the year 1778. She was ſeventy years of age; very corpulent, and her legs œdematous. Her ſkin and urine were highly tinged with bile; but no bile was found in her ſtools. She had been affected with very acute pains in the biliary duct, which were now abated, but the obſtruction ſtill remained. She had been taking pills of ſoap, aloes, and rhubarb, with ſaline medicines, by Mr. Nunn's direction. I ordered that theſe ſhould be repeated, and that ſhe ſhould take five grains of calomel morning and evening. Theſe ſhe took till a ſpitting came on, which was kept up by continuing the calomel, to the quantity of a pint and a half daily for a fortnight; at the end of which time ſhe was perfectly cured. Her ſtools were examined, but no calculi found. She died at the age of eighty-two, without any return of her diſorder.

CASE III.

Mrs. Reeve, wife of Mr. Abraham Reeve, merchant, in Hadleigh, Suffolk, a lady of a delicate habit, between twenty and thirty years of age, ſent for me in November 1779. She complained of pain at the pit of her

ſtomach:

ſtomach: her ſkin and urine were both yellow; and there was a deficiency of bile in the fœces. I was in hopes that calomel in ſmall doſes might open the duct, without ſalivating her. She took as under.

℞. Calomel, gr. i.
Pulv. Rhab. gr. iii.
Sapon. Venet. ℈ſs.
Elix. aloes. q. s. ft. bolus mane et veſpere ſumendus; ſuperbibendo miſturæ ſequentis, ℥ij.

℞. Sal. Abſynth. ℈iv.
Succ. limon. ℥ij. Peracta effervefcentia, adde
Aq. font. ℥v.
Sp. cinnam. ℥i.

Syr.

Syr. croci, ℥ſs.

Vini. antim. g$^{tt.}$ lxxx. M.

Although the doſe of the calomel was ſo ſmall, ſhe had not taken it a week before a ptyaliſm came on, which, in a few days, opened the duct, and her jaundice went off entirely; a few doſes of manna and Glauber's ſalts ſtopped the ſpitting, and removed all her complaints. It is now eighteen years ago, and ſhe has had no return. Gall-ſtones were ſought for, but none found.

CASE

CASE IV.

In June 1780, I was ſent for to Mr. Joſeph Clark, a gentleman-farmer at Semer in Suffolk, aged ſeventy years. His ſkin and urine were very yellow; his ſtools white; and from the pain at the pit of his ſtomach, there was no doubt of his having biliary calculi. After an emetic, I ordered him the following medicines:

℞. Calom. gr. i.
Pulv. rad. Rhab. gr. iii.
Sapon. Venet. gr. v.
Syr. ſimp. q. s. f. bolus omni nocte et mane ſumendus, ſuperbibendo miſt. ſalin. ℥ii.

In about a week a ptyaliſm came

on, which was kept up by the continuance of his medicines, ſo that he ſpit about a pint and a quarter daily for two or three weeks. He was perfectly cured, and never had any return of his diſorder. He died aged eighty. No gall-ſtones were found.

CASE V.

On the 22d. of March 1781, I was ſent for to Mrs. French, a widow-lady of this town, (Hadleigh in Suffolk) about ſixty years of age. She complained of acute pain, at times, in the biliary duct: her ſkin and urine were very yellow. After an emetic, I ordered her the following medicines:

℞. Calom.
Aloës ſocot. ā. ā. gr. ij.
Sap. Venet. gr. viij.
Syr. ſimp. q. s. ft. bolus mane
et veſpere ſumendus cum
doſi miſturæ ſalinæ.

She continued the medicines for about three weeks without ſalivation, or removal of the obſtruction. She now became feveriſh: and I thought it better to omit the calomel, and give her ſome cooling medicines. She got rid of her fever; and on the 21ſt. of May following, returned to the calomel, &c. but took only one grain for a doſe; which ſhe continued for ſome time, without any abatement of her diſorder. I then diſcontinued the calomel, keeping her bowels open with aloes, rhubarb, and tartar-emetic, to which was joined a little ſoap, giving her opiates occaſionally. From this time to the end of the year 1782, ſhe took opening medicines only, but of which, and all others, ſhe grew tired. She was perſuaded to try ſome noſtrum; but her jaundice never left her. On the 8th. of October 1783, I was deſired to viſit her again: ſhe then took the following medicine:

℞. Calom. gr. i.
Aloes ſoc. gr. iij.
Conſ. cynoſb. gr. v. ft. bolus omni nocte vel alterna ſumendus, ſi alvus aſtricta ſit.

She took theſe, not always regularly, and opiates, till March 18, 1784; during which time I ſaw her but ſeldom, Mr. Simpſon, who is ſince dead, her apothecary, having the ſole care of her. On the 18th. March 1784, I was deſired to viſit her again. Her complexion and her urine were now of a colour between black and yellow; her ſtools without bile. I now had a wiſh to try what the addition of a ſmall quantity of opium, to prevent the calomel going off by the bowels, would do. I therefore ordered as follows:

℞. Calom.
Aloes ſoc.
Philon. Lond. ā. gr. iv.

Syr.

Syr. ſimp, q. s. ft. bolus omni
noćte cum doſi miſturæ ſali-
næ ſumendus

She continued in the uſe of theſe medicines for near a month before a ptyaliſm came on. She now, I believe, ſpit a pint in a day for near a month before any bile got into the duodenum; and even then it paſſed but in ſmall quantity, and the colour of her ſkin was not altered. However, as the duct was not wholly obſtructed, I prevailed upon her, ſupporting her with cordials between her medicines, to perſevere: which happily ſhe did for more than two months, ſpitting every twenty-four hours about a pint and a half. She then was perfectly cured

cured, and has had no return of jaundice ſince. She is now more than ſeventy years of age. No gall-ſtones were found.

CASE VI.

Mrs. Game, in the neighbourhood of Needham-market, in the county of Suffolk, was, in September 1780, recommended to me by Mr. Abbot ſurgeon at Needham. She appeared to be about forty years of age; and had had a biliary obſtruction for more than a year. Her ſkin was of a blackiſh yellow. I deſired Mr. Abbot to try the effects of ſalivation from calomel: he did ſo; and I received a letter from him ſome time after, in which he ſaid, "The bile then began to emulge." She lived ſome months afterwards. Mr. Abbot thought the ſubſtance of the liver was indurated; and indeed I thought ſo too; for ſhe ſaid ſhe could, with her hand, feel her right-ſide very hard.

CASE VII.

Mrs. Elliot, a farmer's wife at Waldingfield in Suffolk, ſent for me on the 3d. November 1784. Her age between thirty and forty years. She had been afflicted with excruciating pains in the biliary ducts, for which her apothecary had given her laudanum frequently. When a gall-ſtone got into the ductus biliarius communis,

nis, jaundice always followed; when it fell back into the gall-bladder, the yellowneſs went off; and ſo on alternately. I preſcribed for her as follows:

℞. Calom. ppt. gr. i.
Aloes ſocot. gr. ii.
Sapon. Venet. gr. vi.
Syr. ſimp. q. s. ft. bolus omni noҁte maneque ſumendus, ſuperbibendo miſt. ſalin. ℥ij.

A ptyaliſm came on in a few days; and about the 13th. of the ſame month, ſhe voided a gall-ſtone which weighed ten grains. The ſpitting was kept up for about three weeks. She voided two more ſtones of the ſame ſize as the firſt, when ſhe was perfectly cured.

Theſe

Theſe calculi, which together weighed about thirty grains, were the lighteſt of their ſize I ever ſaw, though I have ſeveral hundreds by me. The ſurfaces were ſmooth, and without the leaſt appearance of eroſion: from this it ſeems to appear, that the mercury did not act upon the calculi, but ſo relaxed the ducts as to facilitate the exit of the ſtones.

But let us now review the firſt five caſes, where every patient was cured, and no gall-ſtones found in the fœces. May we not reaſonably ſuppoſe, as none of thoſe patients had any return of the diſorder, that the mercury in thoſe caſes acted as a ſolvent?

CASE VIII.

In June 1784, I was deſired to viſit Mrs. Harwood of Brightlingſea in Eſſex. I ſaw her but once; and from the ſymptoms and nature of her jaundice, I ſuppoſed it to be in conſequence of biliary calculi. I deſired Mr. Inman, her ſurgeon, who lives at St. Oſyth, to try the effects of ſalivation raiſed by calomel: he did ſo; and I had the pleaſure of hearing from him a few months ago, that after ſpitting ſeveral weeks, ſhe got perfectly well; and has had no return, though it is now fourteen years ſince.

CASE IX.

Mr. Canham of Bemont-Hall in Eſſex, a gentleman of about fifty years of age, conſulted me, on the 7th. of April 1785, on account of a jaundice, which, preceded by pain, came on and went off ſeveral times; but now continued longer than uſual. I ordered the following medicines:

℞. Calomel. ppt. gr. i.
Rad. Rhabarb. pulv.
Philon. Lond. ā gr. v.
Syr. ſimp. q. s. ft. bolus mane et veſpere ſumendus, cum duabus unciis miſturæ ſalinæ.

On the 24th. I was ſent for to him. He was then ſpitting; which I deſired, by by the continuance of his medicines, might be kept up for ſome weeks. It was ſo; and his jaundice left him. No calculi were found. On the 10th. of February 1787, his jaundice returned; and the ſame medicines were again reſorted to. I forgot whether he was ſalivated or not the ſecond time; I therefore wrote to Mr. Veſey, a ſurgeon at Thorpe in Eſſex, to know what he recollected of Mr. Canham's caſe. His anſwer is as follows:

Dear Sir,

Agreeable to your requeſt, I have inſpected my books, and find Mr. Canham was put upon a mercurial courſe on the 7th. of April 1785,

and

and kept in a gentle ſalivation to the 23d. of June following, till the jaundice entirely diſappeared.

On the 10th. of February 1787, upon the jaundice making its appearance again, he then was put upon the ſame mercurial courſe, which he took for ten days, which carried off the jaundice; but to the beſt of my recollection, it did not bring on ſalivation, only ſlightly affected his mouth. He never had any further appearance of the jaundice; nor were there any calculi found.

I am,
Sir,
Your moſt humble ſervant,
Wm. Veſey.

Thorpe, 4th. Sep. 1795.

CASE X.

In Auguſt 1785, I was deſired to viſit Mrs. Bennet of Kerſy. She appeared to me to be about thirty years of age. I ordered her ſome pills, compoſed of calomel, ſoap, and rhubarb, which ſoon brought on a ptyaliſm, and her jaundice (for that was her diſorder) was gradually going off;—when Mr. Roſe, her ſurgeon, ſince dead, not knowing my intention, gave her ſeveral doſes of manna and Glauber's ſalts, till her ſpitting was conſiderably abated; and, as that diminiſhed, her yellowneſs returned in proportion, and increaſed. I deſired him to repeat the calomel, &c.

till the ſpitting returned, which he did for two or three weeks, when ſhe was perfectly cured. From the ſymptoms, acute pain, &c. at times, there was no doubt that her jaundice aroſe from calculi. Whether her ſtools were or were not examined, I cannot tell. She has not had, now for thirteen years paſt, any return of the diſorder.

CASE XI.

Mr. Golden, a tanner of this town, (Hadleigh) ſent for me on the 5th. of July 1788. He had a jaundice, which, from the ſymptoms, there was no doubt aroſe from biliary calculi. He was about forty years of age, of a very

very corpulent habit. I preſcribed for him as follows:

℞. Calom. ppt. gr. i.
Pulv. Rad. rhab.
Philon. Lond. ā. gr. v.
Syr. ſimp. q. s. f. bolus mane et veſpere ſumendus ſuperbibendo miſt. ſalin. ℥ij.

About the 10th. of the ſame month, one grain more of the calomel was added to each bolus. On the 12th. his gums grew ſore, and ſpitting came on plentifully; which was continued till the 15th. when the duct was opened, and a large quantity of bile found in his ſtools. His jaundice went off ſoon, but his ſpitting was ſo great, to upwards of ℔ij. in a day, that I thought

thought it neceſſary to check it, by giving him frequently, doſes of lac ſulph. and nitre. His ſtools were examined, but no gall-ſtones found. It is now ten years ſince, and he has had no return of jaundice.

CASE XII.

Mrs. Perkins, wife of a gentleman of the law at Manningtree in Eſſex, ſent for me on the 9th. of December 1790. Mr. Rogers, her apothecary, ſaid ſhe was, in the beginning of her diſorder, troubled with acute pains at the pit of her ſtomach; that yellowneſs followed, which, though the pain was ſometimes abated, did not wholly go off. He had given her ſoap, rhubarb,

barb, aloes, &c. but the jaundice kept increaſing. Her complexion was of a colour between black and yellow. I thought there was no time to be loſt; I therefore preſcribed for her as follows:

℞. Vini ipecac. ℥i.
Antim. tart. gr. i. M. ft. hauſtus ſtatim cum regimine ſumendus.

℞. Rad. Rhabarb. pulv.
Conf. opiat. ā ℈ſs.
Syr. ſimp. f. bolus poſt emet. operationem ſumendus.

And the following morning to begin with the boluſes and mixture as under:

℞.

℞. Calom. ppt.
Pil. ex. aloe.
Conf. opiat. ā. gr. iii.
Syr. ſimp. q. s. f. bolus mane et veſpere ſumendus cum miſt. ſalin. ℥ij.

As ſhe was coſtive, I ordered the following injection;

℞. Decoct. pro enemate, ℥x.
Olei olivar.
Syr. bacc. ſpin. cerv. ā ℥ij.
Pil. ex aloe, ʒij.
Sap. moll. ℥ſs. M. ſtatim tepide injiciend.

The glyſter procured very little diſcharge of fœces; I therefore ordered the following pills:

℞. Calom. ppt.
Pil. ex aloe, ā. gr. v.
Syr. ſacch. q. s. f. maſſa in pilulas duas dividenda, veſpere ſumend. et, ſi alvus aſtricta ſit, mane repetend.

Theſe did not open the bowels ſufficiently; therefore on the 13th, (when I ſaw her again) I ordered the pills to be repeated every four hours, with three ſpoonfuls of the following mixture, till a free paſſage ſhould be procured.

℞. Infuſ. ſennæ, ℥v.
Tinct. ſennæ, ʒv.
———jalapii, ʒiij.
Syr. roſar.
Kali. tart. ā. ʒij.
Mannæ, ℥ſs. M.

December 15. The medicines had procured a conſiderable diſcharge of fœces, but not tinged with bile. I therefore ordered for her as under:

℞. Calom. ppt.
Ocul. cancr.
Conſ. Roſ. ā. gr. v.
Syr. ſimp. q. s. ſt. maſſa in pilulas mediocres divid. ſtatim. ſum. cum doſi miſt. ſalin.

She complained of great weakneſs and languor; therefore the following cordial mixture was ordered:

℞. Tinct. lavend. comp.
—— caſt. ā. ʒiij.
Aq. diſtill. ℥v.
Syr. ſacch. ℥ſs M. cap. cochl. ij. vel iij. larga, in languore.

Spitting now came on; and her urine was not ſo loaded with bile as it had been: but a purging ſupervening, checked the ſpitting; and ſhe grew more yellow. On the 18th. I ordered calom. gr. iij. joined with a few grains of conf. opiat. to prevent its running off by the bowels, to be taken twice in a day. I was now fearful that the ſubſtance of the liver was affected, as a round prominent tumour was to be felt in the region of the liver. But as her fever was not high, I ordered the calomel to be continued: and this day the ſpitting returned plentifully; and for about ten days, ſhe ſpit every twenty-four hours not leſs than a pint and a half.

Her ſkin and urine became every day of a better colour; and there was plenty of bile in her ſtools. The tumour, which was before prominent, now felt flaccid and knotty, not unlike, as Mr. Rogers, her ſurgeon, and a practitioner in midwifery, obſerved, a placenta. During the time the ducts were open, ſhe voided an aſtoniſhing quantity of black ſabulous matter in every ſtool; and which, when put upon a hot iron, burned like pitch, emitting a very offenſive vapour. She continued ſpitting, and voiding this biliary ſandy-like matter, till about the 17th. of January 1791; the liver gradually decreaſing, and now nearly of its natural ſize. There is great reaſon to ſuppoſe, from the knotty ſtate of the liver after the bile had got a free paſſage, and the tumour leſſened, that not only the ductus cyſticus, and ductus hepaticus, but that the pori biliarii were likewiſe obſtructed; for I do not think it poſſible for a human gall-bladder to contain a fourth part of the calculi, ſhe voided, not much larger than ſand. Did the mercury in this caſe diminiſh the ſize of the calculi? The lady had reſolution enough to perſevere in the uſe of her medicines and ſpitting to the end of the month, or ſome time longer; and happily got rid of her diſorder. There was one ſtone voided, the laſt that paſſed, about the ſize of a pea.

CASE

CASE XIII.

Mrs. Phillebrown, mother to Mrs. Marratt, a banker's lady at Manningtree, ſent for me in April 1787. But as my attendance was not a regular one, I wrote to Mrs. Marratt for information, in the following terms; and I received the annexed anſwer.

Madam,

About eight years ago, I was deſired to viſit your mother, who had then a jaundice, ariſing, I ſuppoſe, from gall-ſtones. If I recollect right, Mr. Rogers, her apothecary, ſaid ſhe had had ſeveral fits of it before I ſaw her; that after acute pain, yellowneſs

yellowneſs followed; further, when ſhe was free from pain, the yellowneſs abated. I well remember that I wiſhed her to be ſalivated, and preſcribed medicines for that purpoſe. But as my attendance was not a conſtant one, I could not be ſo exact in obſerving the progreſs, as otherwiſe I ſhould have been. I have thoughts of publiſhing upon this diſorder; therefore ſhall be much obliged to you to inform me of what you recollect of her caſe. The following queſtions will perhaps aſſiſt you. How often, before I ſaw her, had ſhe returns of her diſorder? After ſpitting came on, how long did it continue? After the ſpitting went off, had ſhe ever any return of jaundice? If her ſtools were examined, were there any gall-ſtones found? What did ſhe die of, and at what age? An anſwer, when convenient, will much oblige,

Madam,

Your obedient ſervant,

Hadleigh, Thomas Gibbons.

6th. April, 1795.

Anſwered.—*Dedham, April* 11, 1795.

Sir,

In anſwer to your letter reſpecting my dear mother, I can ſay, I very well remember your preſcribing the medicines for her, (at a time there was but little hopes of her recovery) which

which cauſed her a very ſore mouth, and a ſalivation. She had always been ſubject to a jaundice and bilious complaint. I muſt ſay, I think thoſe medicines lengthened her life the remaining years, as ſhe never had any return of the jaundice; but looked upon herſelf worn out, the laſt year or two, being ſeventy-ſix years of age. We would many times have wiſhed to have had Dr. Gibbons to her; but as ſhe had no particular diſorder to point out, we could not perſuade her to it. In anſwer to the queſtions you have given me: 1ſt. She had always been diſordered with a bilious habit and jaundice. 2dly. I think her ſpitting continued three or four weeks. 3dly. It certainly recovered her, as I do not remember ſhe ever had any return of the jaundice. 4thly. No gall-ſtones were found; what came from her was not regularly examined. 5thly. At the age of ſeventy-ſix, ſhe had an eaſy paſſage out of this world. I believe ſhe always thought highly of the medicines; and had ſhe had any return, you certainly would have been ſent for.

I am, &c.

G. Marratt.

In only one caſe have I tried the effects of calomel in an inflammation of the liver. Some years ago I was deſired to viſit Mr. Griggs, a linen-draper in Hadleigh, aged about forty-five years; whoſe liver was ſo much enlarged, that a tumour of the right-ſide might be ſeen. He had a conſiderable degree of fever; was very yellow; his ſtools deficient of, but not without bile. I ordered him calomel, which he took for ſeveral weeks; but no ſpitting followed. The calomel was omitted; but his diſeaſe at laſt proved fatal. Does not inflammation prevent the mercury affecting the ſalivary glands?

The two following caſes were communicated to me by Mr. Travis, an ingenious ſurgeon at Eaſt Bergholt, in this county; they are ſtrikingly corroborative of the facts related in the preceding pages, and of the inferences which thoſe facts are calculated to ſuggeſt.—

Mrs. Abbot, aged fifty, of a ſcrofulous habit, and ſubject to biliary complaints, has now, July 30, 1796, a total obſtruction of the flow of bile into the inteſtinal canal, and the colour of her ſkin is of a dark yellow approaching toward black; ſhe complains of violent pain in the region of the liver, attended with almoſt continued

tinued vomiting. Pulſe very quick, and heat exceſſive. Urine very high coloured, and ſo diminiſhed in quantity as not to exceed half a wine glaſs in twenty-four hours; fœces nearly black, and reſembling in their texture coagulated blood; tongue foul; thirſt urgent; no reſt; appetite ſo greatly impaired that ſhe has not for ſome time taken more than a ſingle boiled turnip daily.

Ordered to take an emetic immediately, and, after its operation, an opening draught was given, and the bolus as below at night.

℞. Calom. gr. iv.
Opii. gr. i. cum conſerva cynoſb.
fiat bolus hora ſomni ſumendus.

On

On the 31ſt. of July ſhe took four ounces of cathartic mixture, and on the 1ſt. of Auguſt commenced the following pills:

℞. Calom. gr. vj.
Pulv. rhæi
Sal. polychreſt. et
Saponis albi āā. ʒj.
Olei junip. $g^{tt.}$ xxxij. cum ſyrupo fiant pil. xxxij. e quibus ſumat iij. bis in die cum hauſtu ſtomach. amaro.

Theſe, with an occaſional cathartic, and the intervention of an emetic, were continued until the eighth of Auguſt, on which day the pills below were preſcribed.

℞.

℞. Calom. gr. xij.
Pulv. ſcillæ gr. xv.
Aloes ſoccotor. ʒj.
Saponis ʒiſs.
Olei junip. g$^{tt.}$ xxxx. cum ſyrupo fiant pilulæ xxxvj. e quibus ſumat iij. bis in die cum hauſtu diuretico amaro

A gentle ptyaliſm was now produced, relieved her greatly, and was continued until the 14th. of Auguſt, when the pills being omitted, the ſpitting went off, and her ſymptoms returned; on the 24th. therefore, the calomel was again had recourſe to.

℞. Calomel. gr. iv.
Opii purific. gr. ij. cum conſerva fiant boli ij. horâ ſomni ſumendi.

℞.

℞. Kali pp. ℈j.
Infuſi gentianæ comp. purg. ʒx.
Tincturæ cardamomi comp. ʒj.
fiat hauſtus 4tis. horis cum ſucco limonis in actu effervеſcentiæ ſumendus.

The bolus and draught were continued until the 28th. of Auguſt, and then altered as follows:

℞. Extracti colocynth. comp. ʒj.
Calomel. gr. xij. cum ſyrupo
fiant boli xij. et ſumat j. bis in die.

She perſiſted in this manner, under a continued moderate ſalivation, until the 6th. of September, when, every morbid ſymptom having diſappeared, the medicines were omitted, and ſhe has ſince remained free from any biliary complaint.

April 9th. 1796, Mrs. Heſſill, aged fifty-five, has a total deficiency of bile in her fœces, which are of a clay colour; the pain in the region of the liver is very acute, and occaſions moſt diſtreſſing ſickneſs and vomitings. Skin of a deep and bright yellow. Pulſe quick and hard. Thirſt great; urine loaded with bile. Was ordered to be blooded, and to take an emetic, and theſe, with ſome aperient ſtomachic medicines, removed the complaint, and ſhe continued well until the 23d. of April, on which day the jaundice with an augmentation of every ſymptom returning, and with the additional one of violent pain on one ſide of her face, the following pills were preſcribed:

℞. Salis polychreſt. et
Pulveris rhæi āā. ℈ij.
Saponis ʒj.
Calomel. gr. vj.
Olei junip. g$^{\text{tt.}}$ xxxvj. cum ſyrupo fiant pilulæ xxxvj. e quibus ſumat iij. bis in die ſuperbibendo cyathum miſturæ cardiacæ

She had taken only eighteen of theſe pills, and conſequently but three grains of calomel, when a hot tile was applied by her friends to relieve the pained ſide of her face, and which in

a

a few hours occaſioned a ſwelling of the ſalivary glands of that ſide, and a ptyaliſm enſuing from the parts thus affected, was ſupported for a fortnight, and compleatly reſtored her to health.

* * *

PART II.

ON THE

FREE USE OF NITRE

IN

HÆMORRHAGY.

I SHALL now proceed to give a relation of ſome caſes of hæmorrhage, which were, either reſtrained, or ſtopped by the uſe of large doſes of nitre.

On the third day of February 1791, Mr. Rayner Cox of Harwich, in Eſſex, who, for ſeveral years before, had been ſubject to hæmoptoe, was taken

taken about eight o'clock in the morning with a return of his diſorder. He was bled, and took, during the day, what he had been uſed to take, an emulſion of ſperma ceti with nitre. At night a draught, into which were put twenty and five drops of æther. I ſuppoſe vitriolic æther. He awoke about one o'clock Feb. 4th. and had a violent return of the bleeding. Mr. Hopkins, ſurgeon, &c. at Harwich, and Mr. Shearman, his late partner and ſucceſſor in the practice of ſurgery and pharmacy, agreed, with his conſent, to repeat veneſection, and give him larger doſes of nitre than are uſually given, viz. ℈ij. for a doſe, in one doſe he took a drachm.

On

On that day, the 4th, I was ſent for. Before I got to his houſe he had had ſeveral returns of the bleeding. The blood, which had been drawn from his arm, was a complete coagulum. There was no ſeparation of ſerum from the craſſamentum. It had an appearance like millet ſeeds ſprinkled upon grumous blood. His pulſe was quick, but not full. I preſcribed for him the following medicines:

℞. Cerus. acetat. gr. iij.
Alum. pulv. gr. v.
Opii. gr. j.
Conſ. cynoſb. q. s. f. bolus ſtatim ſumendus et poſt horas quinque repetendus

℞. Kali pp. ʒj.
Succ. limon. ℥ij.
Aquæ diſtil. ℥vj.
Syr. limon. ℥ſs.
Nitri pulv. ʒij. M. cap. coch. iv.
ſubinde.

At three o'clock in the afternoon he brought up about two tea cups full of blood, freſh and florid; and at ten the ſame evening as much more: At one o'clock in the morning on the 5th. day of February, at eight, and at ten o'clock in the forenoon of the ſame day, he brought up, each time, about 6 ounces of blood.

Things now put on a ſerious aſpect. His urine was tinged with blood, which every hour grew redder. I

was

was much alarmed. The patient, however, during this trying ſcene, was perfectly calm in his mind. In this ſituation no time was to be loſt. We agreed to try what large doſes of nitre frequently given would do. He, accordingly, took a drachm every two hours in a cup of barley decoction. About that time Ruſpini's ſtyptic was extolled by ſome. Mr. Cox aſked me if I thought it would interfere with the nitre. After having taſted it, I could not diſcover any thing likely to decompoſe the nitre therefore conſented. He took a tea-ſpoonful one hour after every doſe of the nitre; in a glaſsful of tincture of roſes. He had not taken more than half an ounce of the nitre before his urine became leſs tinged, and gradually grew paler till Feb. 6th. when it was quite lympid. Dr. Hamilton of Ipſwich, agreeable to the wiſh of his brother Charles Cox, Eſq. was deſired to meet me. He came, but ſo rapid was the progreſs of the remedy, that the bleeding was entirely ſtopped before he arrived. Here the reader will perhaps aſk, How can you attribute the good effects in this caſe to the nitre, ſince he took other medicines? The following caſes will, as well as the poſtſcript at the end of this, I think, put the matter out of doubt.

The nitre happily never offended

his ſtomach, but it occaſioned a diſagreeable irritation in the proſtate glands and ſphincter muſcles with a frequent diſcharge of urine. The doſes therefore were, after the third day, leſſened, and given at longer intervals.

He had had no return of bleeding when I ſaw him Feb. 9th. 1791.

Poſtscript.

Mr. Cox has lately favoured me with an account of himſelf. He ſays, that, now and then, upon taking cold, he has had a cough, which has been followed by ſome ſlight returns, but none alarming. He adds, that nitre, with a cool regimen, ſoon ſet all things right.

Mr.

Mr. POLLEY'S CASE.

On the 9th. day of Jan. 1792, I was ſent for to Mr. Robert Polley of London, who was then on a viſit to a relation of his at Edwardſtone, by Boxford in Suffolk. He appeared to be about the age of twenty-four years. He had, from a breach in his lungs, been often troubled with hæmoptoe; for which he had put himſelf under the care of an eminent phyſician in London, who ordered for him ſmall doſes of nitre joined with pulv. e tragac. comp. and a mixture compoſed of tincture of roſes &c.

When I ſaw him he had brought up, at the diſtance of four hours each

time,

time, for the greateſt part of the preceding day and night, about five or ſix ounces of freſh arterial blood, and was reduced ſo low that he looked like a perſon in the laſt ſtage of a pulmonary conſumption. He had a harraſſing cough, his pulſe was very quick and thready: what he expectorated was not purulent, but he brought up a great many globular ſubſtances like tubercles, about the ſize of peas, which ſeemed to be compoſed of gritty particles, like ſand, cemented with mucus ſo fetid that the patient himſelf could hardly bear the ſmell of them. I never met with any thing expectorated ſo offenſive. I ordered for him as follows:

℞. Nitri purificati ʒj.
Sacch. alb. ʒſs.
Coccinel. pulv. gr. ij. M. f. pulvis, ſtatim, ex poculo, decoct. hord. ſumendus, et quarta quaq. hora repet.

and, now and then, two ounces of a mixture of which tincture of roſes was the principal ingredient.

He had not taken more than four of the powders before the blood thrown up, was, not only leſs in quantity but at longer intervals. His urine, which was before remarkably high coloured, became gradually clearer, and, at length, returned to its natural ſtate. I ſaw him on the 10th. when his bleeding was ſtopped. But

from

from the colour of a ſtool he had had, it was evident he had ſwallowed a conſiderable quantity of blood, which was now grown very black and offenſive. I therefore preſcribed the following draught:

℞. Salis Rupel. mannæ āā. ℥ſs. coq. in aq. puræ q. s. col. ℥iſs. add. tinct. ſennæ. ſyr. roſ. āā. ʒj. f. H. ſtatim, cum regimine, ſumendus.

This had the deſired effect; his bowels were cleanſed and his fœces became of a natural colour. I therefore deſired him to go on with the powders, repeating them every four hours. He did ſo, till he had taken regularly, upwards of forty. They never once offended his ſtomach. As he had no return of bleeding, I deſired him to omit the powders and take, in lieu of them, the following mixture:

℞. Decoct. cort. Peru.
Infuſ. roſ. āā. ʒiij.
Tinct. cort. Peru. ℥j.
Acidi vitri, dilut. g$^{tt.}$ xl. M. cap. coch. iv. bis terve in dies.

Having made ſome ſtay in the country he returned to London. I did not hear that he had any recurrence of the hæmorrhage. But that, three or four years afterwards, he died of a phthiſis pulmonalis. The reader will ſee, from the ſmall quantity of the cochineal in the powder, that

that it was an ingredient, merely to diſguiſe the medicine. And here, by the by, I would recommend it to practitioners, by colouring, not injurious, ſo to alter the appearance of ſome medicines, as that the ſick may not know what he takes. I have ever ſeen that patients in general expect more from a medicine the compoſition of which they are ignorant of, than from one they are acquainted with. I remember a lady many years ago, who was troubled with a violent heartburn, ſhe ſent for a phyſician, who preſcribed for her a draught ſimilar to the following:

℞. Cretæ pp. ʒj.
Aq. cinnam. ſimp. ℥j. f. hauſt.
ſemel biſve in die, cardialgiâ
urgentâ, ſumendus.

This corrected the acidity of the gaſtric fluid, and was a great favourite for ſeveral years; but, at length, ſhe had occaſion to go to London, and deſired her apothecary, who had prudently kept the compoſition a ſecret, to ſend her the Doctor's preſcription; he did ſo. In London ſhe got it tranſlated into engliſh, and, behold, what was the conſequence? ſhe took no more "chalk draughts!"

But there are other patients, many of the clergy for inſtance, and other gentlemen of liberal education, who have

have attended anatomical and chemical lectures, and perhaps acquired a knowledge of the theory of phyſick. Theſe are not to be put off with an ipſe dixit. They have a right to know the phyſician's opinion of the diſorder—the intention of cure, and by what means it is to be brought about.

I was ſome years paſt ſent for to the Right Honourable Richard Rigby of Miſtley Hall in Eſſex. He had had a fit of the gout, but his chief complaints were, when I ſaw him, great irritation of the nervous ſyſtem, violent rheumatic pains in one ſhoulder, and arm, and, beſides theſe, he had the ſhingles. He told me that when

when he was well he had been in the habit of taking Dr. James's antimonial powder, and analeptic pills. That they, when he got warm in bed, produced a gentle perſpiration which continued till morning; that when he got up, the check upon the ſurface occaſioned a determination to his bowels, and that then he had an ample ſtool, and was comfortable for the whole day. But, that now, he had no perſpiration, nor evacuation from his bowels unleſs he took rhubarb. "Now ſir, what do you mean "to give me, for, you muſt know, I "take no medicine without being "acquainted with the compoſition, "and what I am to expect from it."

I told him I thought James's powder was the beſt remedy he could take, aſſiſted by ſuitable medicines, for that James's powders, by proper additions might be made to act, either upon the ſkin, ſtomach, or bowels. "This ſir," ſaid he, "is very well in theory. "But do you think you can bring it "to practice?" I told him I thought I could. "Then ſir, preſcribe as ſoon "as you pleaſe." I told him he would have nothing to take till bed time. I knew his James's powders were to be depended on, therefore deſired his valet de chambre, who had the care of them, to give me a couple, one of which I put into a draught, compoſed of camphor julep and tincture of opium, which he took in bed; and I deſired him to take now and then a cupful of warm barley decoction; and, if he had no ſweat in four hours to ſend his ſervant to me. The ſervant came and I went to his maſter. I aſked him if he had had any perſpiration. He ſaid no, but that he was not quite ſo reſtleſs as he had been, his ſkin, though not moiſt, was lax. I repeated the draught, and deſired, ſhould it not produce the effect expected, that I might be called at the end of the next four hours. I went to bed and ſlept till eight o'clock the next morning. I then viſited and found him in a very benign ſweat, and deſired him not to check it ſuddenly,

denly, but, as he wiſhed to get up, that his covering might be removed by degrees. On getting up he went to his water cloſet, and at breakfaſt ſaid, he thought he had got into his uſual tract again. He repeated the powders and draughts the night following, with the ſame effect, and then left them off, ſaying he had no more occaſion for them, which proved true.

And now having made a digreſſion from the caſes of hæmorrhagy, I hope the reader will allow me to offer him ſome obſervations relative to the treatment of the ſick, which, I think, may be of uſe both to the doctor and patient.

I remember to have ſeen a publication, by a phyſician of good abilities too, but who, I have ſince heard, was not upon friendly terms with the apothecaries, in which, with no ſmall degree of warmth, he inveighs againſt ſaline draughts, juleps, ſperma ceti mixtures, ptiſans, &c. &c. What good, ſays he, can a ſaline draught do, though taken every four hours? I agree with this gentleman, that theſe are not medicines of ſuch powers as to produce any great effect upon the body independent of the mind. But every practitioner of experience, well knows what an influence the mind has upon the body. Numberleſs facts might be given where impreſſions of the mind (eſpecially in caſes of ſcurvy) have proved favourable, or fatal. Let one inſtance ſuffice. On the 30th. of Jan, 1744, Mr. Ives informs us, "that he had near ſeventy "perſons ill of the ſcurvy in the "Mediterranean. Yet the joy of "meeting the enemy's fleet, and beat"ing them, had ſuch an effect, that, "on the 11th. of Feb. following, "when the engagement happened, "there were not more than five men "abſent from their fighting quarters:" And this Dr. Lind juſtly attributes to the influence of the mind upon the body; for he adds, that, during eleven days, the ſick had no more than five ſervings of broth.

I have been ſent for to many patients at particular times when I ſhould have been ſatisfied in doing nothing. But would this ſatisfy the patient? No. His mind was to be made eaſy, till nature or the diſorder pointed out what was to be done. How difficult is it, often, to diſtinguiſh between cauſe and effect; how cautious, therefore, ought the preſcriber to be, leſt by violent medicines, raſhly given, he deſtroy the patient before the diſeaſe. I have been told that the celebrated Dr. Goldſmith, by taking too large doſes of James's powders, at an improper time in his fever, fell a victim to his temerity.

Mr. Kettle, an innkeeper of Hadleigh, aged fifty and five years, was attacked in October 1797 with violent vomitings of blood; which was of a very dark colour, and of a grumous quality. After due allowance for the contents of the ſtomach, which were uſually mixed with the blood thus evacuated, he brought up for three days ſucceſſively not leſs than two pints and one half, or three pints of blood per day; preceded by a ſenſe of great weight, ſickneſs and anxiety. His pulſe was quick, ſmall, and irregular, his ſkin hot, thirſt conſiderable; body rather coſtive, and his ſtools were loaded with black and fetid blood: urine in ſmall quantity and turbid: little or no reſt, great proſtration of ſtrength: legs and feet œdematous. Upon examination there appeared a very extenſive, hard, and irregular tumour of the liver, and which preſſing upon the vena portarum had, probably, given riſe to this alarming hæmorrhage. As I had experienced the beſt effects from large doſes of nitre in active hæmorhagy, I now determined to try what the reſult would be, in paſſive hæmorrhagy, for, in this caſe there were no inflammatory ſymptoms. I accordingly preſcribed for him as follows:

℞. Infuſi roſæ rubræ ℥iſs.
Nitri purificati,
Sp. nucis moſch. et
Syrupi caryoph. rub. āā. ʒj. f.
hauſtus quartis horis ſumendus.

No ſickneſs or nauſea enſued from the uſe of the nitre. In leſs than forty-eight hours the bleeding was nearly ſtopped. In the courſe of nineteen days he took ſeven ounces of nitre without the leaſt inconvenience, on the contrary his appetite was conſiderably mended. His urine, during the uſe of the medicine, was ſecreted in larger quantity, and became lympid, and the induration of the liver was conſiderably leſſened.

In about three weeks, however, after he had leſt off the nitre, the anaſarca of the lower extremities had increaſed, and ſymptoms of aſcites appearing, I ordered ſmall doſes of the digitalis purpurea, which relieved him greatly. But a return of his dropſy in the year 1798 proved fatal.

SOME OBSERVATIONS ON THE USE OF NITRE IN HÆMORRHAGY, IN A LETTER TO DR. GIBBONS, BY NATHAN DRAKE, M. D.

Dear Sir,

I tranſmit you a caſe of uterine hæmorrhage in which the free uſe of nitre was attended with the moſt beneficial effects. It will corroborate in no ſmall degree your former experience on this ſubject, and, together with the caſes you have accumulated, clearly prove, I think, the great efficacy of this medicine in large doſes, though given long after ſolution, and though unaccompanied with any immediate affection of the ſtomach.

Nitre when exhibited thus amply has hitherto been ſuppoſed to act on the circulation either from the cold produced during its ſolution in the ſtomach, or in conſequence of nauſea excited by its action on the muſcular fibre of that organ. Mr. White of Mancheſter, in his Treatiſe on the Management of Pregnant and Lying-in Women, when ſpeaking of the beſt method for ſuppreſſing violent floodings, obſerves, "large doſes of nitre "have often afforded inſtant relief; "which I ſuppoſe is owing to the "power which Dr. Alexander juſtly "aſcribes to it, of almoſt inſtantly

"retarding

" retarding the velocity of the circu-
" lation, and of ſurpriſingly diminiſh-
" ing the number of pulſations: but
" it ſhould be given immediately af-
" ter being diſſolved, as the ſame gen-
" tleman has obſerved, that it then
" poſſeſſes that power in a greater
" degree:"* and Dr. Darwin, in the ſecond volume of his ZOONOMIA, has a paſſage of ſimilar import: "Large
" doſes of nitre," ſays he, "by pro-
" ducing nauſea debilitate and leſſen
" the energy of the circulation, and
" and are thence uſeful in inflamma-
" tory diſeaſes. It muſt be added,
" that if nitre be ſwallowed in pow-
" der, or ſoon after it is diſſolved, it
" contributes

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* Fifth Edition, page 141, 142.

" contributes to leſſen the circulation by the cold it generates, like ice-" water; or the external application " of cold air."*

Now in the caſe before me, and in thoſe which have fallen under your own experience, the nitre, with the exception of Mr. Polley, was given ſome hours after its ſolution, and produced in no inſtance ſickneſs, or even nauſea, yet the hæmorrhage was ſuppreſſed, and the heat and irritability diminiſhed. It appears to me, indeed, difficult to conceive how the tranſient cold occaſioned by the ſolution of a drachm or two of nitre in the ſtomach, and which is repeated only

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* Page 760.

only every three or four hours, can ſufficiently retard the motion of the heart to produce any powerful effect. Ice-water, indeed, which may be given every five or ten minutes, ſo as to induce permanent cold, promiſes, in caſes of urgency, to be of great ſervice, but it is obvious, that nitre cannot be thus repeated without danger of immediate rejection.

As to the effects of nauſea ariſing from nitre in hæmorrhagy, nothing can place its inutility in a more ſtriking point of view than the caſes of Mr. and Mrs. Kettle; both laboured under the ſame complaint, and from ſimilar cauſes; the former took, in nineteen days, ſeven ounces of nitre, a drachm at a doſe, without any nauſea, and with every good effect; the latter, to whom I was called in April 1798, and whoſe evacuation of blood from the ſtomach was, as nearly as poſſible, both in quantity and quality, ſuch as her huſband's, experienced ſo much nauſea and ſickneſs from the nitre that I was obliged altogether to omit it, yet during theſe effects the hæmorrhage, ſo far from diminiſhing, encreaſed to a moſt alarming degree. It was however at length put a ſtop to by bleeding in the arm, and the liberal and long continued uſe of the tinctura ferri muriati.

The power which Dr. Alexander has aſcribed to nitre, of *inſtantly* retarding

tarding the velocity of the circulation, and of *ſurpriſingly* diminiſhing the number of pulſations, I have never experienced. Though to Mr. Kettle and to Mrs. Bradſtreet large and repeated doſes were given, and attention was paid to the ſtate of the pulſe, both immediately after it was taken, and when ſome hours had elapſed, no ſudden change was perceptible, though in both the pulſe *gradually* became ſlower and ſofter. Mrs. Kettle's pulſe, which was quick and hard, underwent no alteration during the nauſea and ſickneſs conſequent on taking the nitre. It ſhould be obſerved, however, that where large doſes of nitre diſagree with the ſtomach, they are in general, rapidly ejected by vomiting, the action of which accelerates the pulſe, and the material once evacuated no nauſea continues, a circumſtance which, if nauſea be the effect intended, ſhould lead us to employ a medicine whoſe powers are more durable, the digitalis for inſtance, in the uſe of which though vomiting may ſupervene nauſea for the moſt part continues.

I am inclined to think that in ſuppreſſing hæmorrhagy, whether active or paſſive, nitre acts merely as a tonic, powerfully though *gradually* diminiſhing at the ſame time heat, irritability and arterial action. That theſe are the effects of the nitrous acid, when

when given with a view to remove debility, late experience has amply proved, and may we not attribute the ſalutary operation of the ſalt under conſideration entirely to this active principle though in union with fixed vegetable alkali?

Believe me, dear Sir,
With great eſteem,
Yours moſt ſincerely,
Hadleigh, Suffolk, Nathan Drake.
May, 1799.

November 10, 1797.

Mrs. Bradſtreet aged 42, has for theſe laſt three or four days laboured under violent uterine hæmorrhagy; ſhe complains of conſiderable pain in her back and loins; the blood flows ſo profuſely as to indicate danger; debility very great; body regular; thirſt urgent; tongue white and dry; extremities cold and rather œdematous.

She has been ſubject to repeated attacks of this complaint for more than two years, which have neceſſarily much injured her conſtitution. Having taken, ſince the preſent return, ſome powerful aſtringents without abating the diſcharge, my opinion was requeſted, and on finding the irritability of the ſyſtem greatly increaſed, and her pulſe near 120 ſmall but hard, I ordered her the following draught:

℞. Infuſi roſæ rubræ ℥iſs.
Tincturæ cinnamoni et
Syrupi caryophilli rubri āā. ʒj.
Nitri purificati ʒj. fiat hauſtus quartis horis ſumendus.

Twelve were taken in four days; they agreed perfectly well with her ſtomach, and on the day after their commencement the hæmorrhage began to ſubſide, and by the fifteenth was compleatly removed.

To prevent a recurrence, however, the medicines beneath were thought

neceſſary,

neceſſary, and, together with a cool though nutritive diet, were perſiſted in for ſome time with every good effect.

℞. Extracti cinchonæ ʒiſs.
Pulveris rhæi ʒſs.
Zinci. vitriolati gr. viij. cum ſyrupo fiant pilulæ xxiv. e quibus ſumat ij. ter in die cum hauſtu ſeq.

℞. Cinchonæ pulv. ℥j.
Corticis aurantii ℥ſs.
Quaſſiæ ligni ʒj.
Aquæ ferventis ℥x. macera per horas iv. et cola.

℞. Infuſi colati ℥iſs.
Sp. etheris vitriol. g$^{tt.}$ xx. fiat hauſtus.

OBSERVATIONS

ON

The Abuſe

OF

FLANNEL WAISTCOATS.

I CANNOT diſmiſs my pen till I have made a few obſervations on the pernicious uſe of flannel. Many medical men adviſe flannel waiſtcoats to be worn next the ſkin. In rheumatic complaints, lumbagos, and a number of other affections of the muſcles and tendons they do well, provided the waiſtcoats

waiſtcoats be not worn too long. What I have to reprobate is, the almoſt general uſe of them in pulmonary conſumptions. The firſt direction to the patient is, "put on a flan-"nel waiſtcoat under your ſhirt." And the waiſtcoat is commonly worn for a month or more, without being waſhed! Can any thing be ſo injurious? Sweat (like urine and thin feces) is an excrementitious fluid. Now what perſon afflicted with a diarrhœa could bear the idea of wearing a ſhirt for a month together. In the phthiſis pulmonalis, where the patient has been all but diſſolved by ſweats, he has been *permitted* to wear a flannel jacket for weeks! The morbid ſweat has been ſecreted, excreted, and abſorbed again, perhaps thirty times over! Can any thing to a thinking perſon appear ſo ſhockingly abſurd? I was ſome time paſt in company with a very ſenſible gentleman, who told me he always wore flannel next his ſkin. I aſked him why he did ſo. He anſwered, "by "the advice of a gentleman of the "faculty." How long do you wear a flannel waiſtcoat? "About a month." How long do you wear a ſhirt? "I have a clean ſhirt every day." Then why not a clean waiſtcoat every day? I have not had an opportunity of ſeeing him ſince, but, before I left him, he was ſo fully convinced of the error of his *obedience*, that, I have no doubt, a reform has taken place. I wiſh theſe hints may bring about a general reform.

APPENDIX.

As my method of curing jaundice, ariſing from biliary calculi, has been adopted by other practitioners and followed with ſucceſs, with additions I ſend this ſecond edition into the world; not doubting that ſalivation, when further tried, will come more into practice.

The Monthly Reviewer's remarks I am bound in duty to the public, and juſtice to myſelf to take notice of. He ſays "that out of the caſes "ſtated, calculi were paſſed only in

“ *one.*” Surely he muſt have read only part of the caſes, or he would have ſeen in Mrs. Elliot’s, page 32 and following, that ſhe voided three large ſtones. And in Mrs. Perkins’s, caſe xii. one large, and an innumerable quantity of ſmall ones were found. His opinion ſeems to be; that where calculi were not found, the jaundice aroſe from ſome other cauſe. The ſymptoms produced from calculi differ ſo widely from thoſe ariſing from inflammations, indurations, and ſchirri, that a diſcerning practitioner cannot, I think, miſtake them. This I can aver, that in all the caſes where no calculi were found every patient had the ſame ſymptoms with thoſe who paſſed calculi; ſuch as acute pain at the ſcrobiculus cordis, preceding yellowneſs. Jaundice diminiſhing when the pain went off, and ſo on alternately. But ſuppoſe mercury not to be a ſolvent, (I have not ſaid it is) and it be admitted that it relaxes the ducts and by that means facilitates the paſſage of the ſtones into the duodenum, why may not, when arrived there, the gaſtric and pancreatic fluids, in ſome habits, act as ſolvents on inflammable calculi? if ſo, ſtones not being found, in all caſes, is accounted for. It is, however, of very little conſequence to the practitioner or patient, how a medicine acts (like the bark in agues) provided the ſufferer get well. As to ſalivation, I have never ſeen the leaſt ill effect from it either in old or young ſubjects; and we have now ſcarce a tyro in phyſic or ſurgery who does not know how to carry a patient ſafely through the proceſs; if not, the reading of my caſes and obſervations attentively, will direct him.

In caſes of hæmorrhagy. Our obſerver objects to the medicines firſt given to Mr. Cox; ſo did the preſcriber, for before the time arrived for the patient's taking a ſecond doſe, large doſes of nitre were reſorted to; therefore the nitre ſhould have been conſidered as the ſucceſsful remedy.

As to Ruſpini's ſtyptic, I believe it did neither good nor harm; for the ſame changes took place in the cure, as were obſerved in the next caſe, Mr. Polley's, where the only thing depended on was nitre. Why *this*, the moſt material of all the caſes, ſhould not have been noticed I cannot imagine. A candid critic, as our Reviewer profeſſes to be, ought not to ſelect what is *againſt* and ſuppreſs what is *for*. But enough. I diſlike cenſure. What I have ſaid is in vindication of the truth of the facts and obſervations I have made.

An eminent phyſician here, ſome time paſt, on a viſit to a friend twelve miles off, was requeſted to ſee a perſon

ſon labouring under an inveterate jaundice, which the doctor thought was in conſequence of gall-ſtones. He deſired his apothecary to ſalivate him with calomel, he did ſo, the patient got better, and is now perfectly well, though many months have elapſed ſince he was ſalivated: the patient being at ſuch a diſtance, and the doctor having ſeen him only twice, he could not give me the particulars of his caſe. But I have ſince heard that he ſpit for about a month. I have had an opportunity of ſeeing him lately, and he remains entirely free from jaundice.

The following is a communication from the city of Norwich.

To Dr. Gibbons.

Sir,

In conſequence of reading your caſes of biliary calculi, &c. I ſend you a caſe ſucceſsfully treated by your method.

I am, Sir,

Your humble ſervant,

Norwich, Henry Reeve.

July 22, 1800.

Martha Greenfield a poor woman aged thirty-three years had been indiſpoſed with different complaints for four months, and now was labouring under jaundice. She complained of great pain and a ſenſe of fullneſs at the pit of the ſtomach: her eyes and ſkin very yellow, urine high-coloured,

coloured, and a deficiency of bile in her fœces. She had felt ſome ſymptoms of this diſeaſe two months previous to the preſent attack, but they ſoon diſappeared without any medical aſſiſtance. She took a grain and one half of calomel with three grains pil. opii every night and morning, to excite ſalivation and alleviate the violence of the pain: purgatives were occaſionally given to keep the bowels in a proper ſtate. The pain was conſiderably relieved by theſe medicines, and ſhe was enabled to attend to domeſtic employment for a week. She was then ſeized with chilly fits, headach, great heat, and frequent vomiting attended with fullneſs and diſtenſion

of

of the ſtomach and bowels. Upon examining the region of the liver conſiderable enlargement and diſtenſion of that viſcus was perceptible, and it appeared hardened and ſchirrous. The calomel was continued, combined with nitre and jalap, till the feveriſh ſymptoms ſubſided and her mouth became ſore. After taking the calomel a fortnight a ſalivation was excited, a ſlight diarrhœa came on a few days after her mouth was affected, and ſhe voided two or three large gall-ſtones. From that period ſhe gradually recovered her appetite and ſtrength, and ſoon became perfectly well, as ſhe now remains.

The annexed letter and caſe I lately received from Mr. Travis ſurgeon at Eaſt Bergholt.

Bergholt, April 20, 1801.

Sir,

You may remember I communicated to you an account of Mrs. Abbot's caſe of jaundice &c. She has had a return of the diſorder: the particulars of which are as under.

I remain, dear Sir,
Reſpectfully yours,
William Travis.

On the 17th. of May 1800, I was ſent for to Mrs. Abbot. She then complained of violent pain, ſickneſs, and fullneſs in her ſtomach; likewiſe pain and fullneſs about the region of of the liver. I gave her an emetic which relieved her, and after that ſome opening medicines, and a bliſter was applied to her ſide. She took, three times in a day, ſome ſtomachic draughts, with ten grains of kali in each. After continuing theſe draughts till the beginning of June, ſhe felt herſelf better, and left them off for a fortnight, at the end of which time, ſhe had a relapſe, attended with all her former ſymptoms, and having received benefit and found relief from the kali draughts ſhe wiſhed to have recourſe to them again. She took them until the beginning of July, taking, at the ſame time, ſome pills compoſed of rhubarb and calomel with ſoap, and though ſhe took half a grain of calomel night and morning, her mouth was not affected. Being now better ſhe gave up all medicines; but ſhe had yet, vomitings every day, bringing up a great deal of viſcid mucus. On the 6th. of October however, ſhe had another violent relapſe, accompanied with almoſt inceſſant vomitings. She returned to the uſe of her former medicines, but finding no relief, after taking them for a fortnight, ſhe wiſhed to be ſalivated, having experienced great benefit from that plan twice before. She began with a grain of calomel night and morning which ſoon brought on a ptyaliſm that continued

tinued three weeks. After the ſalivation had continued about a week the vomiting ceaſed and all her other complaints diſappeared and ſhe remains perfectly well to this day. She has never vomited ſince the ſalivation. Be it obſerved that her ſkin was yellow: her urine much loaded and high-coloured, and ſo offenſive that it could ſcarce be borne in the houſe. Her fœces were ſometimes the colour of light clay, at others full of bile. Her pulſe 120, great thirſt, and her ſkin remarkably hot. Whether any gall-ſtones were voided or not I cannot ſay, as a proper examination of the fœces was not attended to.

Before I cloſe it may not be amiſs to clear up the doubts of one whom I conſider as an impartial and candid Reviewer, concerning the abuſe of flannel waiſtcoats: I have not the leaſt objection to flannel worn either under or over the ſhirt provided it be *perfectly* clean. On the contrary, I do not know, where people are liable to take colds, a greater prophylactic than flannel. When in full practice I have been frequently, in winter nights, ſent for to Harwich, 22 miles from Hadleigh. I always took with me a flannel waiſtcoat with ſleeves, and a pair of fleecy hoſiery ſtockings: not to guard againſt damp, for I was always ſure of a well-aired bed

bed either at Mr. Rayner Cox's or at Mr. Hopkins's, gentlemen of the faculty. In other inſtances I have, at a patient's houſe, been put into a bed, much the *worſe* for being the *beſt*, which has been ſo damp for want of uſe, that, had it not been for my *body guard*, I ſhould have been a great ſufferer before morning, and probably, for a length of time afterwards.

THE END.

Printed by J. Burkitt, Market-place, Sudbury

A

TREATISE

ON THE

STRUCTURE, ECONOMY,

AND

DISEASES

OF THE

LIVER;

TOGETHER WITH

AN INQUIRY INTO THE PROPERTIES

AND

COMPONENT PARTS

OF THE

BILE AND BILIARY CONCRETIONS.

BY

WILLIAM SAUNDERS, M.D. F.R.S.&S.A.
And Fellow of the Royal College of Phyſicians.

THIRD EDITION.
With Additions and Improvements.

London:
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GEORGE YARD, LOMBARD STREET.

1803.

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TO

SIR GEORGE BAKER, BARONET,

PHYSICIAN TO THE KING,

AND TO

THE QUEEN;

FELLOW OF THE ROYAL COLLEGES OF PHYSICIANS
OF LONDON AND EDINBURGH;

Of the Royal Academy of Medicine at MADRID,

F.R.S. and S.A.

DEAR SIR,

PERMIT me to preſent to you the following work, preſuming that as the two former editions have been well received by the Public, this will be leſs unworthy of your notice than when before addreſſed to you as Preſident of the Royal College of Phyſicians; this ſtation, in itſelf reſpectable, has derived a conſiderable acceſſion of dignity and importance from your talents and learning, and your retiring from it, has been the occaſion of *deep regret to many, but to none more than myſelf, who muſt ever retain a grateful remembrance of your friendſhip.*

I am proud to acknowledge that to you, I owe the ſituation which I hold in the College, and which gave me an opportunity of delivering the principal part of what is contained in the following pages, in the form of a Gulſtonian Lecture.

That you may continue to live the patron of ſcience, and enjoy the reſpect which is due to your diſtinguiſhed character, is,

Dear Sir,

The ſincere wiſh of

Your obliged and humble ſervant,

WILLIAM SAUNDERS.

London, Dec. 20,
1802.

PREFACE.

The two former editions of the following ſheets have met with a ſale which far exceeded the Author's expectations. The reſpectful notice which has been taken of the work, by Gentlemen of the firſt rank in the profeſſion, and whoſe approbation and eſteem he muſt ever be proud to acknowledge, together with the favourable manner in which it has been received in the various critical periodical publications, have induced him to extend his inquiries and obſervations upon the ſubject ſtill farther, and to prepare a third edition for the preſs.

The attention which his book has excited, has been the occaſion of his being frequently conſulted, and of bringing many caſes under his review, which have enabled him to extend his practical obſervations, and to obſerve the variety of ſymptoms which occur in the different ſtages of thoſe diſeaſes in which the liver is the organ chiefly affected.

INDEED, ſo general is the influence of the different functions of this viſcus, that any derangement of them may be expected to have a conſiderable effect on various other organs. Probably many complaints, which the patient is ready to refer to the organs of reſpiration, or to the ſtomach, or other parts of the alimentary canal, may have their ſource in a morbid ſtate of this organ.

The accumulation of bile in the liver and gall-bladder, producing a turgeſcent ſtate of that organ, and perhaps occaſioning a congeſtion in the large blood-veſſels of the abdomen, may be the frequent cauſe of that ſpecies of apoplexy which is beſt cured by purgatives, and ſuch other means as promote the evacuation of bile. It is probable likewiſe, that the good effects perceived from the operation of active purgatives in the early ſtages of acute diſeaſes, and the advantages ariſing from ſpontaneous or even artificial diarrhœa in the more advanced ſtages of them, chiefly depend on the hepatic ſyſtem (ſo frequently the ſeat of dangerous fevers) being kept pervious. It is alſo probable, that ſome affections of the mind may be intimately connected with ſuch a ſtate of the liver.

The Author, not only by his own obſervation, but alſo by the correſpondence which he has had with Gentlemen of the profeſſion in India, where Hepatitis is extremely frequent, is more fully confirmed in the propriety of the treatment he has recommended in the firſt ſtage of that diſeaſe. He muſt ſtill, therefore, conſider the antiphlogiſtic practice, there ſpecified, as the moſt likely to ſucceed; and with all his partiality for the uſe of mercury, even before the inflammatory ſymptoms have ſubſided, he thinks that an early application of it, if not accompanied by the lancet, may have diſagreeable effects, from which he concludes that there is ſomething very peculiar in the inflammation of the liver, perhaps depending on its ſtructure.

That he poſſeſſes no prejudices againſt this important article of the Materia Medica, will clearly appear, when the reader diſcovers the attention he has paid to the different modes of exhibiting it in ſome diſeaſes ariſing from an affection of this organ. In a ſtate of the liver approaching to ſcirrhus, he conſiders it as the only medicine to be depended upon, and more than this, in other diſeaſes, ſuch as diarrhœa and dyſentery, which he conſiders as being frequently accompanied by ſuch a ſtate of this organ, he has experienced conſiderable advantage from the uſe of mercury.

Being conſulted by many patients labouring under aſcites, and other ſpecies of dropſy, he has frequently been able to trace the ſource of theſe diſeaſes to ſome morbid ſtate of the liver. The Author has, therefore, in the later editions of this work, given ſome explanation of the general pathology of dropſy; more eſpecially, however, as depending on the reſiſtance to the tranſmiſſion of blood through the venous ſyſtem of the liver: he has likewiſe extended his inquiries on the ſubject of diet, and the probable influence of the hepatic ſyſtem on the proceſs of digeſtion.

HE cannot conclude this Preface without acknowledging the obligations he has to Dr. Haighton, Lecturer on Phyſiology and Midwifery at Guy's

Hoſpital, for the ingenuity and accuracy with which he has planned and executed the various experiments made on brute animals, for the purpoſe of explaining and corroborating the doctrines advanced in this Treatiſe.

Dec. 12, 1802.

DURING a ſhort reſidence at Cheltenham, this ſummer, the Author was conſulted by many invalids; and had an opportunity of converſing with others who were under the uſe of the purgative ſaline waters of that place.

He ſoon perceived that they were very indiſcriminately uſed in a variety of oppoſite diſeaſes; and that their effects were ſuch as might have been expected from ſo injudicious an application of their medical powers. The caſes in which they appear to be uſeful, are evidently connected with a turgeſcence and congeſtion of the hepatic ſyſtem in full and oppreſſed habits; where the ſecretion of bile is inconſiderable, and where the habit is coſtive.

THEY are of more uſe in ſanguineous conſtitutions, than in pallid and chlorotic habits.

In diſeaſes of ſimple dyſpepſia, with flatulency and acidity, and in caſes of indurated and ſcirrhous livers, he has not perceived any uſeful operation from them.

They are chiefly uſeful when their purgative operation is ſuch, as to relieve from a ſenſe of diſtenſion immediately conſequent on their being taken into the ſtomach: they loſe their effect by daily repetition, and ought frequently to be alternated with other purgatives, or aided in their operation by other means. In very delicate exſanguine chlorotic habits, he found the purgative plan univerſally improper; and in ſuch caſes recommended a chalybeate ſpring lately diſdiſcovered at Cheltenham, from which the greateſt advantage was derived. He met with many perſons who had returned from the Eaſt and Weſt Indies, with very torpid bowels, and diminiſhed ſecretion of bile; in ſuch caſes, the purgative water was uſeful, and may be proper as preparatory to the future uſe of a more tonic plan of treatment.

The daily exerciſe and general habits of temperance, practiſed at Cheltenham, contribute not a little to promote the recovery of ſuch invalids.

In irritable and feveriſh habits, with thirſt and general languor, evidently ariſing from ſome local and viſceral affection, the waters of Cheltenham are leſs calculated to do good. In caſes of jaundice, from ſome reſiſtance to a free diſcharge of bile, and a ſenſe of heat, diſtenſion, and fullneſs, encreaſed ſoon after eating, the Cheltenham water is uſeful. In caſes of jaundice from gall-ſtones alſo, it is uſeful, but ſhould be drank warm.

In calculating the number of perſons, and the variety of diſorders among the invalids at Cheltenham, he thinks he may fairly conclude, that one-third of the whole was benefited,—one-third derived no advantage,—and another third was evidently hurt by perſevering in the purging plan. Among the laſt caſes, ſymptoms of languor, flatulency, thirſt, and debilitated digeſtion, were induced, or much increaſed.

How far the newly diſcovered chalybeate water may be employed to leſſen or remove theſe inconveniences,--and under what circumſtances it may be ſafely and beneficially had recourſe to for that purpoſe,—is a ſubject which has already occupied a good deal of his attention; but it is one of too much extent, and requiring too minute a reference to individual caſes, to be attempted here.

CONTENTS.

CHAP. I.

ANATOMICAL DESCRIPTION OF THE LIVER, *p.* 1.

THE Bile ſecreted by the liver. Figure of the liver not eſſential to its function, but determined by that of the animal. Its figure deſcribed. The proportion of its lobes different in the fœtus. Cauſe of this difference is the umbilical vein. Its ſituation deſcribed. Different in females, and in the fœtus. Its connexion to the diaphragm by ligaments explained, Its ſituation with reſpect to the ſtomach. The gall-bladder, its ſituation deſcribed.

CHAP. II.

Veſſels of the Liver, p. 13.

SECRETORY organ, plentifully furniſhed with blood—The ſame veſſel generally carries blood both for ſecretion and nutrition—Hence the proportion devoted to each purpoſe uncertain. In the liver this difficulty is removed. How arterial blood only is fit for nutrition. Origin and branches of the hepatic artery. Its ramification through the liver and termination. Bile ſecreted by venous blood carried by the vena portarum. Origin of this vein. Its ſuppoſed ſtructure. Gliſſon's opinion on this ſubject. Its ramification and termination. Pori biliarii, and hepatic duct. Its muſcularity conſidered. Abſorbents ſuperficial and deep ſeated. Their origin and termination—Their communications. Their valves leſs complete here than in other parts. May be injected contrary to the courſe of their contents. Nerves—their origin.

CHAP. III.

The Nature of the Blood circulating through the Vena Portarum conſidered, p. 35.

VENOUS blood more favourable for the ſecretion of bile than arterial—but in what reſpect the blood of the vena portarum differs from other venous blood is a deſideratum. The ſubſerviency of the ſpleen to the œconomy of the liver conſidered. The arguments by which it is ſupported are examined, firſt, the ſplenic blood is poured into the vena portarum.—Second, the changes it is ſuppoſed to receive during its paſſage through the ſpleen. Experimental inveſtigation of this ſubject—Blood from the ſplenic vein not more fluid than other blood; nor more putreſcent. Bile, ſecreted after the ſpleen is taken out, compared with other bile. No ſenſible difference. Hence the liver is independent on the ſpleen. A reflection drawn from experimental inquiry. Animadverſions on venous blood as being better adapted to the biliary ſecretion than arterial. Arguments favouring this opinion drawn from the fœtus.

CHAP. IV.

Of the Hepatic Artery, and the Office of the Blood which it contains, p. 55.

DIFFERENT opinions on this ſubject. Whether an auxiliary to the vena portarum. The grounds of this opinion as founded on a ſuppoſed analogy between the liver and the lungs. The analogy diſapproved. The communication of veſſels ſuppoſed to be favourable to this doctrine. In what reſpect the artery may be ſaid to communicate with the duct. No concluſion to be drawn from theſe facts. The capacity of the hepatic artery compared with the bulk of the liver conſidered. The proportion between muſcles and the arteries that ſupply them. Tendons compared with their arteries. The brain with its arteries. All theſe parts are nouriſhed, but require different proportions of blood for their actions. The action of a ſecreting organ ſuppoſes great vital energy—hence much blood. An extraordinary luſus naturæ.

CHAP. V.

Interior Structure of the Liver, p. 75.

In what part of the liver is ſecretion performed?—Terminations of the vena portarum. Reaſons for thinking the ſecretion is performed in the moſt minute veſſels. How far ſecretion depends on any peculiar arrangement of parts. The opinions of Malpighi and Ruyſch ſtated. Appearances of cryptæ in the liver. Alſo in the kidney.

CHAP. VI.

Courſe of the Bile, p. 83.

FROM the pori biliarii to the trunk of the hepatic duct. Its properties changed by by the abſorbents. Its paſſage into the duodenum ſubject to interruption. Effect of this on the gall-bladder. Gall-bladder, its contents and uſe. The common opinion doubted by Albinus. The exiſtence of hepatico cyſtic ducts in the human ſubject, diſproved. Further conſiderations on the œconomy of the gall-bladder. Is it a paſſive receptacle? The affirmative argued for from analogy. It is not viſibly muſcular,—nor irritable on the application of ſtimuli; therefore a paſſive receptacle. Regurgitation of bile from the inteſtine by the duct how prevented. The cauſes impeding the flow of bile into the inteſtine. Permanent ſtructure. Spaſm doubtful, except at the termination of the duct. Preſſure from ſcirrhous ſtate of pancreas.

Scirrhous impacted liver. Jaundice not always connected with obſtruction in the biliary ducts, proved by the yellow fever. Morgagni and Boerhaave's opinion of jaundice, ariſing from obſtructed ſecretion, conſidered. By what channels the bile paſſes into the blood. Haller's opinion by regurgitation. Abſorption conſidered. Is jaundice produced both by regurgitation and abſorption?—That the abſorbents take up the bile is proved by experiment. But does not regurgitation likewiſe concur?—The affirmative proved by experiment. Inference.

CHAP. VII.

Bile, p. 117.

ITS colour, varies by dilution. Conſiſtence. Viſcidity, perhaps not eſſential. A ſaponaceous fluid. Has a bitter taſte and faint

nauſeous ſmell. Conjectures on its conſtituent parts drawn from its ſenſible properties. The ancient mode of inveſtigation by heat alone, inadequate. The moſt natural examination, by chemical attractions. Gentle evaporation diſſipates the odorous principle along with the water—the reſiduum ſolid and brittle. Its viſcidity depends on an animal mucilage. The effects of mineral acids. More ſtrongly marked when aſſiſted by heat. They effect the decompoſition by engaging the alkaline principles. Proofs of this. No common ſalt pre-exiſts in the bile, but only its alkaline baſis. Its colour and taſte reſide in a reſinous principle. Proofs. Recapitulation. Its antiſeptic properties conſidered.

CHAP. VIII.

On Biliary Calculi, p. 137.

EXTERNAL characters, and ſenſible properties, are various,—therefore not mere inſpiſſations of bile. Different ſpecimens ſhould be examined. An inquiry into the conſtituent parts of a calculus. Its ſenſible properties. Relative ſolubility in ol. terebinth and alcohol—leaves an earthy reſiduum. Much reſinous matter. Inquiry into the preſence of the alkali. The mineral and volatile alkali detected.

CHAP. IX.

Of the Uſe of the Bile, p. 147.

THE probability of a connexion between red blood and the bile. The ſubſerviency of bile to chylification, conſidered. The reſult of experiment not favourable to that

opinion,—nor its probability ſtrengthened by the ſymptoms of jaundice. Its principal uſe is that of a ſtimulus to the inteſtines. This corroborated from hypochondriaſis and chloroſis. May correct acidity in the primæ viæ from its alkaline principle, and reſiſt a tendency to fermentation. When defective may be ſupplied by artificial means. Its defect more productive of diſeaſe than its exceſs. Is antiſeptic from its bitterneſs.

CONTENTS.

OF THE DISEASES OF THE LIVER,

DEPENDING ON ITS FUNCTION

AS AN ORGAN OF SECRETION.

CHAP. I.

Of the increaſed Secretion of Bile, p. 157.

Excessive ſecretion of bile the endemia of warm climates. Its effects and ſymptoms. A change of climate advantageous. Leſs diſtreſſing to natives than foreigners. Bile more antiſeptic in warm climates than in cold. Obſtinate diſeaſes connected more frequently with a defect of bile, than its exceſs. Diluents advantageous. Internal uſe of warm water conſidered. Bath, Briſtol and Buxton waters, probably act

on this principle. In profuſe biliary ſecretions, emetics are improper. Cheltenham water, obſervations on its uſe. Regimen for bilious habits. Cholera morbus, a deſcription of. The bile appears to be imperfect. Cure.

CHAP. II.

Of the diminiſhed Secretion of Bile, p. 189.

THIS ſometimes depends on chronic inflammations of the liver. Its ſymptoms, connected with the ſtomach. Proper regimen in ſuch caſes. The temporary loſs of bile, how ſupplied. The redundency of bile to correct acidity in the primæ viæ, (a Note). The uſe of mercury conſidered. Other modes of treatment.

CHAP. III.

Of Obſtruction to the free Paſſage of Bile into the Duodenum, p. 225.

JAUNDICE. Definition. Hiſtory. Decline. Appearances on diſſection. Diſtinguiſhed from chloroſis, and the endemic fever of the Weſt Indies. Influence of the paſſions on the biliary ſecretion. Bile is imperfect when the ſecretion is hurried. A ſedentary life diſpoſes to jaundice, &c. Alſo the abuſe of ſpirituous liquors. Obſervations on the biliary ducts, and on calculi as paſſing through them. Preſſure on the ducts, a cauſe of jaundice. Prognoſis. Cure. By ſolvents impracticable. Emetics, their uſe. Purgative medicines, bitters, &c. Exerciſe. Mr. Dick's treatment of jaundice by calomel, (Note). His obſervations on the uſe of mercury in hepatitis.

CHAP. IV.

Of the Diſeaſes to which the Liver is ſubject in common with other Organs of a Glandular Structure, p. 259.

Liver ſubject to acute and chronic inflammation. Hepatitis, ſymptoms of. Symptoms vary from the part of the liver attached. Diſtinguiſhed from other complaints. Stomach affected ſympathetically. Hepatitis, its termination in ſuppuration. Theſe abſceſſes not always viſible externally, but diſcharge themſelves internally. In what ſenſe the biliary ducts can convey the matter into the duodenum. Immediate communication with the inteſtines more frequent. The preciſe part varies with the particular ſeat of the abſceſs. Hepatitis ſometimes confounded with peripneumony. Alſo with inflammation of the ſtomach. Favourable termination of. Has corroded large blood-veſſels. Sometimes terminates by metaſtaſis. Suppurative

ſymptoms of, not always evident. Sometimes ends in gangrene. Often terminates in a ſcirrhous. Scirrhous liver ſometimes miſtaken for dyſpepſia, how diſtinguiſhed. Scirrhous liver, ſymptoms of, appearances on diſſection. Explained. Proximate cauſe of hepatitis inveſtigated by analogy. The veſſels may be in two oppoſite ſtates, (viz.) one active, the other paſſive. Application of this. How an active inflammation may degenerate into an indolent one. The operation of remote cauſes. Some curative indications induced. Dropſy, its cauſes and connexion with diſeaſes of the liver conſidered. (Note). Tubercular ſtate of the liver. Their formation explained. The particular ſeat of active and indolent inflammations conſidered. Cure of the active inflammation in its firſt ſtage. Blood-letting. Bliſters. Laxative medicines. Antimonials and diluents. Neceſſity for the antiphlogiſtic plan particularly urgent in warm climates. When ſuppuration follows, the matter eſcapes different outlets. Duodenum, colon, lungs, integuments. This conformable to a law of nature. Theſe outlets not equally favourable to the patient. Lungs leſs ſo than inteſtines, or the integuments. The pus ſeldom effuſes into the abdomen. May be diſcharged by lancet. Slow, but progreſſive return of health. Explanatory remarks. Conſiderations on the uſe of mercury. Its exhibition, how regulated in the Eaſt Indies. Dr. Curry's opinion on the uſe of calomel in acute Hepatitis, (a Note). Its action in ſcirrhous liver further conſidered. Its application to the vicivity of the liver not particularly advantageous. No direct communication between the abſorbents of the ſkin and liver. Abſorption more rapid from ulcerated and veſicated ſurfaces. Mercury not detecttable in the ſecretions by chemical teſts. The connexion between ſcirrhous liver and dyſentery. Concluſion.

CHAP. I.

ANATOMICAL DESCRIPTION

OF THE

LIVER.

SECT. I.

To the ſecretion of the bile Nature has deſtined an organ of conſiderable ſize, called the Liver; its magnitude is greater than that of any gland in the body, ſo that it occupies a large portion of the abdominal cavity.

2. Its ſhape is ſo irregular, as not to admit of compariſon with any mathe-

matical figure; it is unlike any body with which we are acquainted. This circumſtance of the liver is perhaps leſs eſſential than many others, as figure does not appear to throw any light on its economy. At leaſt we naturally incline to this opinion, from taking a view of this viſcus in different animals, when it appears that the external figure of the liver is determined by the figure of the animal itſelf, or of that particular cavity in which it is contained. In the human ſubject it is ſomewhat flattiſh and convex on its anterior ſurface, irregular on its poſterior, having ſeveral depreſſions; at its inferior edge there is a fiſſure extending ſome way up, particularly on its poſterior ſurface, which forms a diviſion of it into two lobes of unequal ſizes. Theſe, from their ſituation in the abdominal cavity, are diſtinguiſhed by the names of right and left, of which the right is the larger. Beſide theſe, there is a ſmaller lobe, ſituated at the ſuperior and poſterior part, called Lobulus Spigelii.

3. Though in adult ſubjects the right lobe is larger than the left, in the fœtus the left is as large as the right. This variety depends on the diſpoſition of the umbilical vein in the fœtus with reſpect to this organ; for on its arrival at that gland it ſends off ſeveral branches, ſome of which, penetrating the left lobe, are of conſiderable ſize; but after birth, when the circulation takes a new courſe,

the whole liver, but more eſpecially the left lobe, diminiſhes in bulk.

4. Beside this variety in the proportion of its lobes, the whole fœtal liver muſt neceſſarily exceed that of the adult in proportion; for, in addition to the veſſels proper to the liver and neceſſary to its economy, there is one peculiar to the fœtus, viz. the umbilical vein. This veſſel, which has its origin in the placenta, accompanies the other veſſels of the cord, and perforates the navel; thence, having reached the inferior edge of the liver, it paſſes along the fiſſure which ſeparates the lobes, and, having entered its ſubſtance, ſends off ſeveral branches; thoſe going to the left lobe are larger and more in number than

thoſe to the right. The umbilical vein afterwards divides into two branches, one, called canalis venoſus, taking the courſe of the vena cava; the other, uniting with the branch of the vena portarum, pours its blood into that ſyſtem; ſo that by much the largeſt proportion of the blood circulating between the fœtus and placenta, paſſes through the liver, and this ſufficiently explains why the fœtal liver exceeds in proportion that of the adult.

5. This organ is ſituated in the ſuperior part of the abdomen, principally on the right ſide; occupies the epigaſtric and the right hypochondric regions, and ſometimes extends into the left hypochondre. Its preciſe ſituation cannot

be eaſily determined, as the inferior part of the cheſt admits of conſiderable variety both in its figure and capacity. In males, where there is a greater capacity of cheſt, the hypochondres are more capacious; hence the epigaſtric and the right hypochondric regions are large enough to contain this viſcus.

6. In females, who have naturally a ſmaller cheſt, which is often ſtill more contracted by tight lacing, the epigaſtric and the right hypochondric regions are inſufficient to contain the liver, it therefore extends far into the left hypochondre; beſide which, it ſometimes, in theſe caſes, occupies no inconſiderable part of the umbilical region. Its ſituation, then, with reſpect to the general

cavity of the abdomen, admits of ſome variety. In the fœtus, it occupies the whole epigaſtric region, and both the hypochondres; not ſo much from any peculiarity in the figure of the upper part of the abdomen, as from a difference in the proportion of the right and left lobe, which has already been noticed.

7. THOUGH the ſituation and extent of the liver in the general cavity of the abdomen, admit of ſome variety, yet its poſition with reſpect to the diaphragm is rather preciſe, being connected to it by doublings of the peritonæum, called ligaments.

8. THIS viſcus, in common with the others of this cavity, receives a covering

from the peritonæum, which, doubling upon itſelf, and quitting the liver, is attached to the diaphragm. This connection obtaining in certain parts, forms the ligaments. The moſt conſpicuous of theſe, is that which is ſituated on its anterior part, in a line correſponding to the fiſſure, forming the diſtinction between the right and left lobe; and which, extending from the ſuperior to the inferior edge, is called by ſome, from its reſemblance to a ſcythe, the FALCIFORM ligament; by others, from its function, the SUSPENSORY ligament.

9. THE lateral portions of the liver are connected in like manner to the correſponding parts of the diaphragm, taking the name of lateral ligaments.

Beſide which, ſome anatomiſts reckon the portion of peritonæum ſurrounding the veſſels which paſs from this viſcus through the diaphragm, as a fourth ligament, and call it the CORONARY ligament.

By theſe different reflections of the peritonæum, the liver is ſupported in its ſituation.

10. But there is yet another part, uſually numbered with the ligaments, which, however, performs no ligamentory function, viz. the ligamentum rotundum.* This paſſes from the concave

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* The ligamentum rotundum has already been noticed under the name of umbilical vein, of which it is to be conſidered as the collapſed remains: for after the circulation through it has ceaſed, which neceſſarily happens at birth, its cavity diminiſhes, and in time becomes nearly obliterated.

part of the liver along its longitudinal fiſſure, and is continued to the umbilicus.

11. Hence in the living ſubject, the ſituation of the liver muſt vary with reſpect to the general cavity, accordingly as the diaphragm deſcends or aſcends, in the acts of inſpiration or expiration.

12. The ſituation of the ſtomach with reſpect to this organ is ſuch, that the right portion of the former is frequently covered by the left lobe of the latter, and, from the bilious tinge frequently found on the external ſurface of the duodenum near the pylorus, it appears that the gall-bladder uſually reſts on this part.

13. The gall-bladder is a bag ſome-

what pyriform in its ſhape, its neck or ſmall extremity being ſituated ſuperiorly, and its fundus, or large extremity, inferiorly. It is lodged in a depreſſion on the concave ſurface of the right lobe of the liver, to which it is attached by a continuation of the peritonæal coat of that viſcus over its ſurface. It varies ſomewhat in ſize according to the degree of diſtention which it ſuffers, but, in moſt inſtances, the fundus projects a ſmall diſtance below the inferior edge of the liver. Being intended by nature to contain bile, it has a duct by which it receives a ſupply of that fluid; but with this peculiarity, that the ſame duct is likewiſe the only outlet through which the bile can paſs into the inteſtines: a circumſtance in the œconomy of this part, which we ſhall have occaſion to conſider more particularly hereafter.

CHAP. II.

VESSELS OF THE LIVER.

SECT. I.

Every organ deſtined by Nature to ſecrete a fluid, is very plentifully furniſhed with blood. The neceſſity of this is evident; for it requires, not only a ſupply of that fluid for the purpoſe of its nouriſhment, but an additional quantity alſo, to enable it to perform its ſecretory functions; as it is from the blood that all the ſecretions are derived.

Such is the œconomy of Nature in glandular bodies in general, that the ſame fluid which is fit for the nouriſhment of the gland, is adapted alſo to its ſecretory office, and is conveyed to the organ by the ſame veſſel. But the phyſiologiſt is unable to aſcertain, with any degree of preciſion, how much blood is allotted to nutrition, and how much to ſecretion.

2. Our knowledge of the economy of Nature in this reſpect, receives ſome light from a peculiarity which obtains in the liver, and which diſtinguiſhes it in a very ſtriking manner from all the other glands of the body. For, while in them the functions of nutrition and

ſecretion are combined in the ſame veſſel, in this, theſe offices are kept apart, and performed by different veſſels. Therefore, by a careful compariſon of the area of the nutrient with that of the ſecreting veſſel, we may readily allot to each its due proportion.—But this idea will be farther purſued hereafter.

3. Blood of every deſcription is not equally fit for nutrition: that only, which has received the change from reſpiration, and which circulates through the arteries, is well adapted to this purpoſe; therefore the liver receives its nutrimental blood from an artery.

4. The rule by which Nature ſeems to be guided in the origin of veſſels ſupplying other organs, obtains equally

in this, as the hepatic artery ariſes from the neareſt conſiderable trunk.—The following is the mode of its origin:

5. The Aorta, while it is paſſing between the crura of the diaphragm, ſends off, from its anterior part, three conſiderable azygous trunks: the firſt takes the name of cœliac artery; the ſecond, which is almoſt immediately under the former, is called the ſuperior meſenteric; and the third, which goes off from the aorta at ſome diſtance from the laſt veſſel, is named the inferior meſenteric artery: the two laſt ſupply the inteſtinal canal.

6. The cœliac trunk ſoon divides into three branches:—the firſt, from its being diſtributed to the leſſer curvature

of the ſtomach, is termed the coronary artery; the ſecond, paſſing to the ſpleen, is called the ſplenic artery; and the third, or largeſt, whoſe office we are now to conſider, takes the name of the hepatic artery.

7. THE hepatic artery, at its origin, is a veſſel of conſiderable ſize, but before it arrives at the liver is ſenſibly ſmaller; the cauſe of which is, that in its progreſs it ſupplies adjacent parts with blood, viz. the right portion of the ſtomach, by means of the gaſtrica dextra and pylorica, and the gall bladder by the arteria cyſtica; therefore, in forming a true eſtimate of the quantity of blood ſent to the liver for its nouriſhment, we are to conſider the area of the hepatic

artery, after the three preceding branches are ſent off.

8. This veſſel, agreeable to the general law of diſtribution, divides into branches before it enters the ſubſtance of the liver; its ramifications then multiply and extend with great minuteneſs through the whole maſs; ſo that in every part of its ſubſtance there is circulating blood poſſeſſed of properties fit for nutrition. But as this blood is in a ſtate of conſtant motion, and is continually diſplaced by ſucceſſive freſh ſupplies, a redundancy is prevented here, as well as in the other parts of the body, by returning veins. The ultimate branches then of the hepatic artery terminate in the hepatic veins, and

theſe return the blood into the vena cava inferior, by three or four venous trunks. Such is the circulation through the liver as connected with its nouriſhment. We are next to conſider it as an organ of ſecretion.

9. THIS organ differs from every other gland of the body with regard to the nature of the blood from which ſecretion is performed. While other fluids are ſecreted from florid arterial blood, which has lately received changes from the air by the intervention of the lungs, the bile is formed from blood of a dark colour, poſſeſſing the common characters of venous blood, and is conveyed to the liver by a vein.

10. THE vena portarum, which con-

veys this blood, takes its name from the part of the liver at which it enters; there being two eminences, one on each ſide of the fiſſure, called the portæ, where this veſſel begins to penetrate. To underſtand the origin of the vena portarum, and the properties of the blood which it conveys, it will be neceſſary to explain the circulation through the chylopoietic organs. The branches of the cœliac and meſenteric arteries, as we have before obſerved, diſtribute their contents to the ſtomach, inteſtines, pancreas, and ſpleen, beſides the hepatic artery, which ſupplies the liver. The blood circulating through all theſe viſcera, except the laſt, being returned by their reſpective veins, is poured into their common trunk, the vena portarum: thus the origin of the vena portarum, appears to conſiſt in the concurrence of all the veins of the peritonæal viſcera, except the liver.

11. As the function of this vein differs from that of other organs, it has been ſuppoſed to poſſeſs ſome peculiarities of ſtructure.—Some have thought it more muſcular than other veins, and that its characters approach nearer to thoſe of an artery. It certainly does not poſſeſs the grand diſcriminating mark of an artery, or the power of preſerving its orifice circular, when divided tranſverſely. If it differs from veins in general, it is in having thicker tunics in proportion to the capacity of its

canal; but with reſpect to the arrangement and diſpoſition of its muſcular fibres, this part of its ſtructure does not appear ſufficiently defined, to authorize us to ſpeak with preciſion.

12. GLISSON, whoſe opinion on this ſubject is not always quoted with approbation, conceived its grand characteriſtic to conſiſt in a continuation of that duplicature of the peritonæum ſurrounding the veſſels going to the liver, in the manner of a capſula, and to which it is uſual to annex his name.

He conceived, likewiſe, that it not only envelopes the trunk of this vein, but accompanies it in all its ramifications through the liver; ſo that if a ſection were made into this organ, the branches of the vena portarum would be diſtinguiſhed from thoſe of other veſſels by the preſence of this adventitious tunic.

13. For this membrane, which the imagination had formed, fancy ſoon ſuggeſted a uſe—Miſtaken obſervation had led him to believe that it poſſeſſed muſcular properties, and that it propelled with force the blood, whoſe motion would otherwiſe have been languid. The inveſtigations of other anatomiſts have not confirmed this opinion. They have diſproved the continuation of this peritonæal capſula beyond the trunk of the vena portarum, and have demonſtrated, that it does not envelop the vena portarum in a particular manner, but

only inveſts it in common with other veſſels, and as ſoon as it has arrived at the liver it quits them altogether, and, by expanding itſelf over the ſubſtance of this gland, forms its tunic.

14. The vena portarum having reached the liver at that part called the great fiſſure, forms one large trunk called the ſinus of the vena portarum, from which three principal branches uſually take their origin; theſe, by forming ſubordinate ramifications in a regular ſeries, at length arrive at their terminations.

15. The extremities of theſe veſſels end in two ways: one with reſpect to the circulation of the blood; the other, as connected with their economy, as

ſecreting veſſels. In the firſt point of view, they inoſculate with branches of hepatic veins, and through that channel return to the inferior cava all that blood which is not employed in the buſineſs of ſecretion. So that the hepatic veins are the common recipients of the contents of the hepatic artery, and likewiſe thoſe of the vena portarum.

16. THE ſecreting termination of this vein is in the beginnings of the hepatic ducts, called pori biliarii; which in their origin muſt neceſſarily be very minute, inaſmuch as they preclude admiſſion of the red particles of the blood: from theſe minute beginnings they gradually enlarge by an union of branches, until at length they paſs out

from the liver at its fiſſure, by two or three trunks, which ſoon after join together, and form the trunk of the hepatic duct.

17. THE ſtructure of this veſſel is apparently membranous, having no fibres which can be conſidered as muſcular, at leaſt as far as we can decide by occular demonſtration. But, as the eye, even when aided by glaſſes, is not always competent to detect muſcularity, we are compelled to have recourſe to another and leſs fallacious teſt, which is—the power of contraction on the application of a ſtimulus. Mechanical and chymical ſtimuli have been applied to this duct in a living animal, without producing any contraction which can

be referred to muſcularity. Some chymical ſtimuli, it is true, will corrugate this canal; but they are ſuch as produce effects only by corroſion, and which they do as readily on inanimate as on living matter.

18. ANOTHER argument againſt their muſcularity is, that canals obviouſly muſcular, readily adapt their capacity to their contents. This law is very evident in the vaſcular ſyſtem. But when a biliary duct has been dilated by the paſſage of a gall ſtone, it does not very ſoon return to its primitive dimenſions. And, perhaps, thoſe painful affections of theſe parts, which have been very commonly conſidered ſpaſ-

modic, may find a more adequate explanation in the paſſage of a calculus.

19. If the internal ſurface of this ſyſtem of veſſels be examined, it will be found moderately vaſcular, as there is an appearance of ſollicles in many parts; hence it is probable, that it ſecretes a mucous kind of fluid.

20. Beside the veſſels already deſcribed, the liver is very plentifully ſupplied with abſorbents, which take their origin from every part of its ſubſtance, but more eſpecially from the branches of the hepatic duct. The proof of this origin will be reſerved until we treat of the economy of this organ. From the interior part, the abſorbents purſue the direction of the ſurface, ſome

ramifying on the anterior and ſome on the poſterior ſurface: their diſpoſition while on theſe parts is arboreſcent. Thoſe on the convex ſurface incline towards the direction of the falciform ligament, along which they paſs, and extending their courſe in the direction of the diaphragm, terminate in the thoracic duct near to that part. Thoſe which ramify on the concave ſurface, form, by a ſeries of junctions, a common trunk, which, paſſing from the liver in the direction of the hepatic artery, and with it and the other veſſels being incloſed in Gliſſon's capſula, terminate in the thoracic duct near the receptaculum chyli.

21. THESE two ſets of abſorbents,

while ramifying within the liver, have a free communication with each other, as may be proved by injection with mercury. From a ſuperficial abſorbent on the convex ſurface, mercury will ſometimes penetrate the ſubſtance, and thence pervade thoſe on the concave ſide, from which the thoracic duct may be filled.

22. THESE veſſels poſſeſs the ſame character while in this organ as they do in other parts of the body; that is to ſay, they are valvular. But notwithſtanding this, they may be injected in a direction contrary to that in which their contents move. This, though apparently a paradox, is ſtrictly conſonant to reaſon and fact; for the function

of the valves here is leſs complete than in ſome other parts of this ſyſtem, ſo that by preſſure, mercury may take a retrograde courſe in the ſame veſſel.—Another reaſon is, that as the lateral communicating veſſels exceed the valves in number, a cluſter of abſorbents may be injected by a courſe in part retrograde, and in part circuitous. It is in this way an injection may be made to paſs through the branches of the ſpermatic vein, in a direction contrary to the natural circulation; yet thoſe veſſels are plentifully furniſhed with valves.

23. BESIDE veſſels, the liver is furniſhed with nerves, though not very plentifully. The par vagum and intercoſtal nerves, while in the cavity of the

thorax, communicate by branches with each other. Near to this part of junction, ſeveral branches are ſent off, ſome of which are diſtributed to parts contiguous, others to more diſtant organs. But there is detached from each ſide, a branch more conſpicuous than the others, viz. the ſplanchnic nerves, which, having pierced the diaphragm, unite.

24. At the point of union, there is formed a ganglion, which, from its creſcent-like figure, is called ſemilunar. From this ganglion there paſs off, in various directions, a number of nervous filaments, which, intermixing and obſerving a radiated courſe, form the ſolar plexus. From this, ſeveral ſubordinate

plexuſes are detached, which receive names from the parts they ſupply; hence the names of ſtomachic plexus, ſplenic plexus, &c.—But from its right portion, ſeveral ſmall nervous filaments paſs, which, ſurrounding the hepatic artery, accompany it to the liver, and take the name of hepatic plexus.

CHAP. III.

THE NATURE OF THE BLOOD CIRCULATING THROUGH THE VENA PORTARUM CONSIDERED.

SECT. I.

HAVING given a general deſcription of the veſſels ſupplying the liver, we are led to examine into the nature of their contents. And here we may remark, that it is very deſirable, but at the ſame time extremely difficult, to aſcertain the peculiar characters of the blood, after circulating through each of the chylopoietic viſcera, previouſly to its paſſage into the liver by the vena portarum; and to determine, why it ſeems better adapted to the ſecretion of bile than common arterial blood, from which other ſecretions are ſupplied.

2. THAT venous blood is more favorable to this ſecretion than arterial, is very evident; and this exception of the liver to Nature's law in the economy of other glands, may be admitted as a proof of it. But the peculiar changes induced in the blood, after circulating through the arteries of the ſtomach, and yielding the gaſtric fluid; after penetrating the pancreas, and there affording pancreatic juice; after pervading the

inteſtines, where it not only give out the inteſtinal mucus, but from its vicinity to fæculent matter, may receive putreſcent properties,—are at preſent, and may perhaps long continue, an ample field of ſpeculation and conjecture.

3. THE power of the ſpleen in this reſpect, has been particularly acknowledged and inſiſted upon; inſomuch that modern phyſiologiſts have conſidered this as its only function. That the ſpleen, in common with the other viſcera, may contribute ſomewhat to change the properties of the circulating blood, ought not to be denied; but whether this be the principal and only

end of its function, cannot, I think, be too carefully inveſtigated.

4. The number and rank of thoſe phyſiologiſts who have conſidered the ſpleen as an auxiliary organ to the liver, are too reſpectable to be oppoſed on any ground, except that of experiment and induction.

When opinion is oppoſed to opinion, and no reaſons adduced on either ſide in ſupport of each, whatever difference there may happen to be in the credit or authority of their reſpective promulgators, the opinions themſelves ſtand on equal ground. It is the reaſons then which ſtamp the true value of any opinion, and to them only we ſhall direct our inveſtigation.

5. FIRST, "*The blood which has circulated through the ſpleen, and which is returned from that viſcus by the ſplenic vein, is poured into the vena portarum.*"

6. THE poſition is unqueſtionably true, and merits conſideration; yet its proper influence on the mind, when conſidered as proof, ought to be duly weighed: for when we recollect, that this circumſtance in the ſpleen is not a peculiarity in that organ, but one which obtains in every peritoneal *viſcus* except the liver, it muſt be evident, that, as far as this argument alone has force, the poſition falls infinitely ſhort of proof, and that the ſpleen adminiſters to the office of the liver in proportion only to the quantity of blood returned

from it. This idea then, appears to owe its birth more to our ignorance of the real uſe of that organ, than to any force in the cauſe juſt aſſigned.

7. SECONDLY, "*The blood in its courſe through the ſpleen, receives changes which enable it the better to concur with the liver in the ſecretion of bile.*"

The changes aſcribed are, a greater degree of fluidity, and a putreſcent tendency.

8. BARON HALLER was of opinion, that the blood returned by the epiploic and meſenteric veins, contained a large portion of adipoſe matter, which it received by the abſorbent power of thoſe veins, and which imparted to it ſo great a degree of viſcidity, that without the

diluting power of the ſplenic blood, which mixes with it when entering the *vena portarum*, it would be liable to concrete.

9. THERE is little probability in this opinion, whether we conſider the power of the epiploic veins to abſorb fat from the *omentum*, or the function of the ſpleen to dilute the blood of the *vena portarum*.

Abſorption by red veins has ſo few advocates in the preſent day, that it were ſuperfluous to adduce either argument or experiment by way of refutation. But waving that controverſy, let us inquire how far the ſpleen acting on its blood as a diluting organ, can be ſupported by facts.

EXPERIMENT.

10. The *abdomen* of a living dog being opened, and the ſpleen with its veſſels being drawn gently out, blood was taken both from the artery and the vein, and received into cups of ſimilar ſhape and equal ſize. On weighing each, there was found to be 420 grains of arterial, and 468 of venous blood. Both coagulated in leſs than two minutes, and in about the uſual time they ſeparated into *ſerum* and *craſſamentum*. In twenty-four hours the *ſerum* of both was accurately weighed: the 420 grains of blood from the ſplenic artery, ſeparated 191 grains of *ſerum*; the 468

grains from the vein, ſeparated 213 grains.

11. But our conceptions of this matter will be much aſſiſted by inſtituting a compariſon with one common ſtandard, ſtill preſerving the *ratio*.

Therefore we ſay, 1000 parts of blood from the ſplenic artery, ſeparated 454, while the ſame quantity from the vein yielded 455: a difference ſo inconſiderable as this, ſurely can never be laid hold of as a proof, that the ſpleen is ſubſervient to the liver on the principle of a diluting organ.

But to purſue the inquiry ſtill further, I thought it of importance to examine the fluidity of the *ſerum.*

EXPERIMENT.

12. EQUAL portions of each *ſerum* were expoſed to nearly the ſame degree of heat until coagulation had taken place. Upon preſſing the ſurface of each, there exuded at different points ſmall particles of a watery fluid, which Senac calls the ſeroſity of the blood; and, upon examining the proportions of each, I could not diſcover any difference. Therefore, if we admit that the liver receives any aſſiſtance from the ſpleen, it does not appear to owe any thing to that organ on the principle of dilution.

13. THE other change ſuppoſed to be induced in the blood by its circu-

lation through the ſpleen, is a putreſcent tendency: this has been conjectured in part from its contiguity to the *colon*, and in part from the languid ſtate of the circulation through that *viſcus.*

Without inſtituting any ſerious inquiries into the probable weight of theſe reaſons, and their ſufficiency to ſupport the propoſition, let us inquire into the fact itſelf.

EXPERIMENT.

14. Two portions of blood, one taken from the ſplenic artery, the other from the vein, were expoſed for four hours to a heat upwards of 90 degrees;

but neither of them betrayed the ſmalleſt marks of putreſcency.

This opinion appears to have originated in an erroneous idea concerning the properties of the bile, which ſome have conſidered as the moſt putreſcent fluid of the body; but with extreme impropriety, as experiments have fully evinced.

15. Thus far our inquiries have favoured very little the idea of any peculiar connection between the ſpleen and the liver. But in order that the refutation may be more complete, it is neceſſary that a compariſon be made between bile taken from an animal whoſe ſpleen has been previouſly removed, and one in which that *viſcus* is ſtill remaining.

EXPERIMENT.

16. The ſpleen of a dog was removed, and the wound healed up in a few days. He was kept ſeveral weeks afterwards, during which time he ran about the houſe like any other dog. Another dog in perfect health being procured, both were ſtrangled, and the bile contained in the gall bladder of each collected in ſeparate veſſels for the purpoſe of compariſon.

17. The colour of both, which was that of a bottle-green, correſponded very exactly.

There was no difference in tenacity:

in both it was juſt ſufficient to prevent its falling from a phial in drops.

The taſte of each was intenſely bitter, and ſlightly pungent.

No perceivable difference in ſmell.

Portions of each being mixed with *litmus*, turmerick, and ſyrup of violets, betrayed no difference of colour.

Equal portions of each of theſe ſpecimens of bile, being mixed with equal portions of concentrated vitriolic acid, a brown colour was produced; and with very diluted vitriolic acid, a ſtraw colour.

With concentrated nitrous acid, both efferveſced, and exhibited a brown colour.

With alkohol, there was a flocculent appearance. Evaporation to a thick extract, left a *reſiduum*, which was highly inflammable.

18. THE reſult of theſe experiments makes it highly probable, that the bile ſecreted after the loſs of the ſpleen, differs in no reſpect from other bile; and that the liver in the exerciſe of its function, is perfectly independent on that viſcus.

19. THUS we ſee, that an opinion which has received a degree of currency from the ſanction of men of eminence, loſes its importance, when examined by the teſt of experiment; and a patient inveſtigation of Nature's ope-

ration, on this plan, muſt ever prevail over authority or prejudice.

20. It has been proved above, that venous blood is the proper ſource of the biliary ſecretion. Several phyſiologiſts aſſert, that additional properties are imparted to it during its circulation through the peritonæal *viſcera*: but neither experiment nor obſervation has afforded any thing concluſive in favour of ſuch opinion.

21. The peculiar economy of the biliary organ in the *fœtus*, is particularly deſerving our conſideration, as the blood from which the ſecreted fluid is made, cannot be conſidered as ſtrictly venous, but as partaking, in ſome meaſure, of the arterial character; and this interme-

diate condition of blood appears to produce a correſpondent ſtate of the bile: for it is matter of notoriety, that fœtal bile is leſs active and concentrated, and abounds more in the watery principle, than that of the adult. This being granted, it neceſſarily follows, that whatever changes are induced in the blood in paſſing from the arterial to the venous condition, thoſe changes furniſh the principles which adapt the blood more completely to this purpoſe. But as phyſiologiſts are not agreed reſpecting the eſſential difference between arterial and venous blood, whatever may be the properties poſſeſſed by the one, of which the other is deſtitute, any reaſoning founded on ſuch an uncertain baſis, muſt neceſſarily be vague and inconcluſive.

22. But to revert to the economy of the liver in the *fœtus*, it may be obſerved, that beſide the blood which is ſent to it by the hepatic artery and *vena portarum*, it receives a large portion by the umbilical vein.

23. To underſtand this, we ſhould advert to ſome of the peculiarities of the *fœtus in utero*. It is very generally admitted, that the *placenta* is to the *fœtus* what the lungs are to the child after birth; that by both a change is induced in the blood, by which it loſes the venous character, and aſſumes the arterial one, in ſuch proportion as the exigencies of each may require. As ſoon as the change

is wrought in the blood of the *placenta*, it is conveyed by the umbilical vein to the liver of the *fœtus*; part of this blood mixes with the common blood of the *vena portarum*, and with it concurs in furniſhing the ſecretion of the bile; the remainder is carried into the *vena cava inferior*, by the *canalis venoſus*.

24. In the *fœtus*, then, it ſeems, that the blood in the *vena portarum* has more of the arterial condition than that of the adult, and likewiſe produces a bile of leſs activity.

CHAP. IV.

ON THE HEPATIC ARTERY, AND THE OFFICE OF THE BLOOD WHICH IT CONTAINS.

SECT. I.

By far the greater number of phyſiologiſts have agreed, that the hepatic artery carries blood to the liver for its nouriſhment, and that this is the only uſe to which it is deſtined. There are a few, however, who incline to a different opinion; and contend that, in addition to this function, it concurs with the *vena portarum* in the ſecretion of the bile.

2. The reaſons on which this latter opinion is founded, have at leaſt ſpeciousneſs to recommend them; and in our inquiry into this queſtion, the merits of both opinions will be carefully inveſtigated: and at the ſame time that we eſteem it our duty to detect and expoſe fallacy wherever it appears, it is no leſs congenial to our inclination to aſcribe to each argument its due and proper force.

3. The firſt poſition advanced in favour of this opinion is, "That it is "probable, that the office of the hepatic "artery is not confined to the nouriſh-

“ ment of the liver, from the diſpro-
“ portion of its veſſels to the bronchial
“ arteries, which nouriſh the lungs.”

4. In examining this argument, we find it is of an analogical nature; and conſequently, if well founded, cannot extend its force beyond preſumption or probability. But we muſt always keep in view the difference between an analogy which is cloſe, and where the points of coincidence are ſtriking and well marked; and one where they are but few, and thoſe not very evident. Even the former will always fall ſhort of proof; while the latter can ſcarcely warrant ſo much as a conjecture.

The object therefore which is held out

as the analogy, cannot be too ſeverely ſcrutinized.

5. THIS argument, then, reſts on a preſumption, that the lungs, which are at leaſt as maſſy as the liver, are nouriſhed by the bronchial arteries, which are much leſs capacious than the hepatic artery; therefore it has been ſaid, if the bronchial arteries are ſufficient to nouriſh the lungs, the hepatic artery ought to do ſomething more than nouriſh the liver; or, in other words, it ought to contribute ſomewhat to the ſecretion of bile.

6. THE inference would be natural and fair, provided it were firſt eſtabliſhed, that the bronchial arteries alone nouriſhed the lungs.

7. BEFORE the days of *Ruyſch*, phyſiologiſts, imagined that the lungs were nouriſhed by the pulmonary artery; they were the more perſuaded of this, becauſe the exiſtence of any other veſſel going to the lungs had not been ſuſpected. But *Ruyſch*, by his art of injecting, diſcovered the bronchial arteries, and theſe he conſidered as their true nouriſhing veſſels; and what ſeemed to give ſtrength and confirmation to this opinion was, that the blood, while circulating through the pulmonary arteries, poſſeſſes the venous character, and of courſe is unfit for nutrition; while that ſent by the arteries of *Ruyſch*, is in every reſpect adapted to this end.

But the following arguments may be

adduced, not only from ſpeculation, but from experiment, to prove, that the ſubſtance of the lungs is nouriſhed by the blood in the extreme branches of the pulmonary artery; and that the bronchial arteries of *Ruyſch* are confined to the nouriſhment of the branches of the *bronchiæ* alone.

As the blood in the ſmaller branches of the pulmonary artery is expoſed to the influence of the air, it muſt neceſſarily receive a change, and aſſume the arterial character; in which ſtate it is as fit for nutrition as the blood circulating in other arteries.

We learn from obſervation and experiment, that when inflammation has occaſioned the ſurfaces of the *pleura* and lungs to adhere, ſuch adheſions become vaſcular, and may be injected by the pulmonary artery: and, as the blood diſtributed to theſe adheſions is for the purpoſe of their nouriſhment, their communication with the ultimate branches of the pulmonary artery proves inconteſtibly, that ſuch blood is fit and proper for the nouriſhment of the lungs.

Hence it appears, that there is not the leaſt analogy between the liver and the hepatic artery on the one hand, and the lungs and the bronchial artery on the other. Conſequently the argument, which reſted on this analogy, is not entitled to notice.

" A ſecond argument in favour of " the hepatic artery aſſiſting in the ſe-

" cretion of bile, is founded on an
" apparent communication between the
" ultimate branches of thoſe veſſels and
" the beginnings of the biliary ducts;
" for (ſay the advocates for this doc-
" rine) a ſubtile fluid may be injected
" with eaſe from one ſet of veſſels to
" the other."

That the biliary ducts may be filled by a ſubtile fluid injected into the artery, we ſhall not deny; but this fact does by no means prove a direct communication between one ſet of veſſels and the other, as will very ſoon appear.

When we reflect on the circulation through the liver, it muſt be evident to us, that, as the hepatic veins return blood both from the hepatic artery and the *vena portarum*; the hepatic artery has communication with the latter by the intervention of the hepatic veins, and that a fluid injection thrown in by the artery, will paſs very readily into the veins; where, if its *exit* be prevented by tying them up, it may regurgitate into the terminations of the *vena portarum*, and thence eſcape into the *pori biliarii.*

But leſt this explanation ſhould be objected to as being too circuitous, another offers itſelf which is much more direct, and which admits of proof from injection.

Water injected by the hepatic duct paſſes with freedom into the hepatic veins; and again, a ſimilar fluid paſſes eaſily from the veins into the duct: hence a fluid, injected by the artery, paſſes firſt into the veins, and afterwards into the *pori biliarii*; ſo that the arguments founded on the phænomena reſulting from injections, cannot be admitted as proofs that the hepatic artery exerciſes a ſecretory function.

The capacity of the hepatic artery with reſpect to the bulk of the liver, has been the ground on which its ſubſerviency to the ſecretion of the bile has very much reſted; from an idea that it carried to the liver more blood than the mere purpoſes of nutrition required: hence it was imagined, that it either co-operated with the *vena portarum* in the immediate act of ſecretion, or that it ſeparated from the blood circulating through its extreme branches, a fluid which formed one of the conſtituent parts of the bile.

But the capacity of the hepatic artery does not neceſſarily ſuppoſe either one or the other of theſe offices; for it is well known, that parts of the body, which are not ſecreting organs, are furniſhed with a larger proportion of arterial blood than the liver: of this kind are the muſcles; the brachial artery being larger with reſpect to the arm, than the hepatic artery is with reſpect to the liver.

Now muſcles, we know, are organs which occaſionally perform ſtrong and repeated actions, which, like other actions when long continued, tend to debilitate and exhauſt the machine; but, when their exertions are moderate, they become invigorated and enlarged, and the increaſe of bulk which they acquire in this way, is principally owing to an increaſe in the capacity of their blood veſſels, as appears, not only from the more florid colour of thoſe muſcles, but likewiſe, from comparing the capacities of the trunks of the veſſels with the muſcles themſelves.

Tendons, on the contrary, though parts equally alive, yet, from their more paſſive condition, require a ſupply of blood ſufficient only for their nouriſhment.

The brain is an organ which, with

relation to its bulk, receives a larger quantity of blood than any other part of the body, yet its function as a ſecreting organ is not obvious.

The inference intended to be drawn from theſe facts is, that parts, though not ſecretory, require a ſupply of blood in proportion to the actions they perform.

Now ſurely we cannot heſitate to admit, that the exertion of a ſecreting organ neceſſarily implies a conſiderable ſupply of vital energy; as it conſiſts in changing the blood into a fluid different in all its properties from the blood itſelf, ſo that it may aſſume a new mode of exiſtence. In other glands, arterial blood ſerves the double purpoſe of being the *pabulum* of the ſecretions, and of ſupplying the organ with vital energy ſufficient to effect its purpoſe; but in the liver, where the ſecretion is performed from venous blood, which is unfit for furniſhing it with vital energy, the neceſſity for a copious quantity of arterial blood ſeems very evident.

An extraordinary example of *Luſus Naturae* occurred to Mr. Abernethy, a gentleman of diſtinguiſhed character both as practitioner and teacher, in this metropolis. In this inſtance, the vena portarum had a ſingle termination: inſtead of conveying its blood into the ſubſtance of the liver, prior to its termination in the inferior vena cava by the intervention of the hepatic veins, the blood returned by the veins of the different chylopoietic organs, was conveyed by the vena portarum immediately into the vena cava inferior, near to the origin of the emulgent veins. The hepatic artery, which appeared to be ſomewhat enlarged, was the only veſſel carrying blood to the liver, and in this individual inſtance it appeared to perform the double function of nutrition and ſecretion. That bile was ſecreted in this place, appears evident both from the preſence of it in the inteſtines and gall-bladder. The latter however, was rather ſmaller than common, and contained only about half a tea-ſpoonful of fluid, which was yellow and bitter, but not ſo acridly or nauſeouſly bitter as common bile. — The ſubject of the preſent caſe was a child apparently about one year old, in every reſpect well nouriſhed.*

This ſingular caſe certainly appears to ſhew, that to a certain degree at leaſt, arterial blood is capable of furniſhing the principles neceſſary to the formation of bile. But it would nevertheleſs be carrying the argument it affords too far, to conclude from thence, that venous blood is not particularly fitted for the purpoſe; and, that it is merely on account of ſome convenience perhaps in the diſtribution of veſſels, that the liver is chiefly ſupplied by a vein rather than by an artery. An extended view of the animal economy proves, that however ſimple the *means* may be which Nature employs, ſhe is always complex in her objects; and that there is not a ſingle organ in the body, which does not fulfil a double purpoſe. Whenever, then, we obſerve a peculiarity ſo remarkable as that which takes place with reſpect to the ſupplying the liver with blood, we may I think infer, that in the natural ſtructure and condition of the body, the venous blood alone yields the bile, as being that which chiefly contains the principles neceſſary to its formation. The power which nature diſplays, in compenſating for any diſadvantage occaſioned by a departure from her ordinary plan, is often truly ſurpriſing; but it does not appear that in the inſtance related above, the compenſation for the defect of venous blood was complete; for the circumſtance of the gall-bladder being ſmaller than uſual, would ſeem to ſhew, that the quantity of bile ſecreted was alſo proportionally leſs; and its quality, as far as could be determined by its taſte, was evidently weaker than common bile. It may therefore be queſtioned, whether this ſcanty and dilute fluid, though ſufficient for the ordinary purpoſes of infancy, would have been adequate to the purpoſes of the animal economy in more advanced life, when the food is conſiderably changed, and bile of greater activity is ſecreted. We have an argument in favour of this concluſion, drawn by analogy from what happens in the caſe of mal-conformation of the heart, when it is ſuch as permits a large portion of the blood to go the round of circulation without paſſing through the lungs, and undergoing the uſual change made in it by the reſpiratory proceſs. Under theſe circumſtances the functions of nutrition and growth are carried on tolerably well for a few years; but ſcarcely ever to the age of puberty. It is therefore not improbable, that although the ſubject of this ſingular conformation of the hepatic ſyſtem appeared well nouriſhed, yet that the unuſual ſtructure may have been either primarily or ſecondarily a cauſe of its death.

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* *Phil. Tranſ. for* 1793. *Part I.*

Admitting the *vena portarum* alone

then, to be the ſecreting veſſel, and that the hepatic artery furniſhes blood only for imparting a due degree of energy, it ſtill remains a queſtion, of what nature the communication between theſe two veſſels is. Perhaps here it may be more conſonant to the true ſpirit of phyſiology, to content ourſelves with the fact, and to trace its application to the economy of this organ, than to enter into hypothetical ſpeculations, which, though they might help to amuſe, might alſo tend to miſlead the young ſtudent, and could add nothing to the information of the more advanced practitioner.

CHAP. V.

INTERIOR STRUCTURE OF THE LIVER.

SECT. I.

It is from the blood circulating through the branches of the *vena portarum*, that bile is ſecreted; but in what particular part of this ſyſtem the change commences, and what is the preciſe ſtructure of parts adapted to this end, are fit ſubjects for inquiry.

2. It has been already obſerved, that the ultimate branches of the *vena portarum* have a double termination; one of which is, with reſpect to the circulation of red blood, by the beginnings of the hepatic veins; the other, with reſpect to the immediate ſecreting veſſels, by the *pori biliarii.*

3. Does the change commence in the ſmall branches of the *vena portarum* before they terminate in the hepatic veins?

4. This is ſcarcely probable; for any bilious properties, which the blood may have acquired at this part, would be loſt with reſpect to the hepatic duct, as it finds a more ready courſe through the hepatic veins: beſides which, the

conſtitution would be in a continual ſtate of jaundice.

5. The probability is, that there is no ſenſible alteration induced on the blood of the *vena portarum* before it terminates in red veins. And as arteries terminate in veins by capillary veſſels, ſo, from the analogy which obtains between the *vena portarum* and an artery, we preſume that the ſame termination does not take place until the branches have become capillary.

6. It follows from this, that the true ſecreting veſſels are the very ultimate branches which communicate with the *pori biliarii*.

7. The next queſtion is, how far the ſecretion of bile is connected with any

peculiar arrangement or ſtructure of theſe parts; or, in other words, whether the ſecreting veſſel communicates with the beginnings of the excretory duct by a cylindrical continuation of canal, or by the interpoſition of a cell or follicle.

8. On this point, the opinions of *Malpighi* and *Ruyſch* divide anatomiſts. *Malpighi* having examined into the ſtructure of glandular bodies, obſerved bundles of circumſcribed knotted appearances aſſuming a globular form, to which he gave the name of *corpora globoſa*; and, on further examination by means of injection, he found them ſtill more conſpicuous in conſequence of diſtention: hence he inferred that

they were hollow, and that each of them conſiſted of a cell or follicle.

9. RUYSCH, it ſeems, in the earlieſt part of life, embraced this opinion; but from employing himſelf, frequently, in exploring the ſtructure of glandular bodies by injection, he was led to relinquiſh the doctrine of *Malpighi*, and to inſtitute another which ſeemed to him more conſonant to nature.

10. FROM his injections he was induced to believe, that the appearances deſcribed by *Malpighi* were fallacious; and that they were not mere *cryptæ*, or cells, as they had been repreſented, but conſiſted of a ſeries of veſſels coiled up in a circumſcribed form, and, that the ultimate branches of the ſecreting veſſel

communicated, both with the returning vein and excretory duct by a continuation of canal.

11. WITHOUT examining the merits of theſe doctrines, as applied to different glandular bodies, we may obſerve, that in the liver there are ſome appearances favourable to the Malpighian opinion. If a ſubtile injection be thrown in by the *vena portarum*, and the liver be afterwards cut into thin ſlices, there will be found knotted appearances, that bear a ſtrong reſemblance to cells, and which, from their equality of bulk, and uniformity of ſhape, cannot be conſidered as the produce of extravaſation.

12. THE kidney likewiſe, when the emulgent artery is minutely injected,

exhibits, in its cortical part, knotted appearances equally regular with thoſe in the liver.

13. BUT here again the queſtion returns upon us,—*Do they, or do they not, conſiſt of aſſemblages of veſſels; or are they mere cavities?* Feeling my incapacity of ſolving this problem to the ſatisfaction of my readers, I muſt beg leave to withdraw myſelf from the conteſt in the beautiful language of the Roman poet,

> "Non noſtrum inter vos tantas componere lites."

CHAP. VI.

COURSE OF THE BILE.

SECT. I.

CONFESSING, then, our inability to determine the preciſe ſtructure and mechaniſm of the parts which form the immediate ſeat of ſecretion, it remains to trace the courſe of the bile, from the interior part of the liver to the place deſtined for its reception.

2. THE bile being formed, is con-

veyed from the ſeat of ſecretion, by the branches of the hepatic duct, which, at their origin, are very minute, and are there called *pori biliarii*. From theſe it paſſes into larger branches, and thence gradually into the trunk of the hepatic duct.

3. It is probable that the bile is not merely conveyed through theſe paſſages, but that it undergoes, during this courſe, a change from a dilute to a concentrated ſtate; for the numerous abſorbents with which the liver is ſupplied, and which originate from its interior parts, make it highly probable, that the more aqueous particles are removed by theſe veſſels, and carried into the circulation; leaving

the remaining fluid in a more concentrated ſtate.

4. THE bile having arrived at the trunk of the hepatic duct, naturally paſſes forwards into the *duodenum*. But we are not to conſider its motion as uniformly progreſſive, and without interruption; for it is probable from the oblique manner in which the biliary duct perforates the ſubſtance of the inteſtine, that the periſtaltic motion of that gut, conſiſting in part of the contraction of its circular, and in part of that of its longitudinal fibres, will, by compreſſing the duct at its termination, occaſion frequent, but momentary interruptions.

5. DURING theſe periods, the duct

muſt neceſſarily ſuffer a degree of diſtention, but which is ſoon relieved by means of a canal of communication with the gall-bladder, viz. the cyſtic duct. So that it appears, that the motion of the bile is not conſtantly in the ſame direction, but ſometimes paſſing from the liver to the inteſtine, at others, from the inteſtine to the gall-bladder.

6. In moſt ſubjects that we examine, this receptacle contains a conſiderable quantity of bile; on an average, an ounce may be about the quantity.

7. If this bile be compared with that of the hepatic duct, it will be found thicker in its conſiſtence, of a darker colour, and more pungently bitter; for here alſo, as well as in the liver, there

are numerous abſorbents, which remove the watery parts. But it is probable, that the increaſed viſcidity depends in part on the mucus ſecreted by the gall-bladder itſelf, ſo that cyſtic bile may be conſidered as a compound fluid.

8. THE gall-bladder then, appears to be an occaſional receptacle for the bile, whenever there is an impediment to its paſſage by the common duct into the inteſtine; and this, as a *diverticulum*, prevents a ſurcharge, which otherwiſe would probably take place in the hepatic duct.

9. THAT this purpoſe is anſwered, is probable from what takes place when, from any cauſe, the cyſtic duct is obſtructed; for in this caſe, the bile,

finding no paſſage into that receptacle when its courſe into the *duodenum* is obſtructed, neceſſarily accumulates in the *ductus choledochus communis* and *hepaticus*, and conſequently, enlarges the capacity of thoſe canals.

10. For a proof that this is a law of Nature, we appeal to the diſſection of morbid bodies where this complaint exiſted; and there is a caſe in point, related by Dr. Ludwig, of Leipſic, in which the *ductus choledochus communis* was dilated to more than an inch in diameter.

11. This explanation of the courſe of the bile to and from the gall-bladder, appears the moſt ſatisfactory, and is that moſt uſually received; but the

eſtabliſhment of it has met with oppoſition upon two grounds.

Firſt, That the gall-bladder ſecretes its own bile; and

Secondly, That the branches of the hepatic duct, while in the ſubſtance of the liver, detach ſmall canals leading immediately into the cyſt; and from which they have received the compound name of *hepatico-cyſtic ducts*.

12. THE principal ſupporter of the former of theſe propoſitions is *Albinus*. He was led to this, from the vaſcularity of the gall-bladder; from its internal ſurface having an appearance reſembling follicles; and from the gall-bladder having been found diſtended with bile,

when the cyſtic duct was completely obſtructed by a gall-ſtone.

The two firſt arguments are barely preſumptive; it will therefore be unneceſſary to refute them in form.

The laſt, being more ſpecious, may deſerve ſome conſideration: we will begin with admitting the fact.

13. Now it is well known, that the gall-bladder frequently contains biliary *calculi*, at the ſame time that it is diſtended with bile. Suppoſing, then, that one of theſe concretions happens to make its way into the cyſtic duct, and that the patient, being of an irritable habit, dies from this, or from any other cauſe, and the body be examined under theſe circumſtances; in ſuch a caſe the

gall-bladder will be found diſtended with bile, when its retrograde courſe by the cyſtic duct is obſtructed: but this diſtention is from the bile previouſly contained in that receptacle.

Here then is a ſource of fallacy.

14. BUT though it be true, that the gall-bladder is ſometimes diſtended with bile when the cyſtic duct is obſtructed, it is no leſs ſo, that it is ſometimes found empty, and ſometimes containing a fluid, compoſed principally of its mucus, tinged with a ſmall quantity of bile; circumſtances which could ſcarcely be ſuppoſed to happen, if there were the direct communication contended for.

15. BESIDES, the opinion relative to the exiſtence of the hepatico-cyſtic

ducts require direct proof: they have been often ſought for, in vain, in man and in other animals. In the ox ſome have contended for their exiſtence. In the ſerpent tribe they certainly do not exiſt; for in theſe animals, the gall-bladder is detached from the liver, ſo that there is no poſſibility of communication, except by the intervention of the cyſtic duct. In the human ſubject, their exiſtence may be eaſily diſproved by the following experiment.

16. If the gall-bladder be emptied of its contents, and either air or water be injected into the liver by the hepatic duct, neither of them will penetrate into the gall-bladder. Now, as fluids of ſo ſubtile a nature as theſe, would readily

pervade thoſe ducts if they exiſted, we neceſſarily conclude, that the gall-bladder receives its bile by the cyſtic duct.

17. But the cauſes which determine the retrograde courſe of the bile from the *ductus communis* into the gall-bladder by the *ductus cyſticus*, are not conſtant and uniform in their operation; they admit of intervals, during which this motion of the bile is either entirely ſuſpended, or changed for one directly oppoſite. Were it not ſo, the gall-bladder would be in a conſtant ſtate of ſurcharge, and, of courſe, become diſtended to an enormous ſize, ſo that there would be danger of its being ruptured.

18. To guard againſt this evil, a

part of its contents is occaſionally diſcharged, from the preſſure of the ſurrounding parts upon it. Thus, this preſſure will vary ſomewhat in its force, from the different degrees of diſtention of the ſtomach by food: and when the ſtomach is diſtended, there is the moſt copious flow of bile from the *duodenum*.

19. From this mode of diſcharging its contents, the gall-bladder is conſidered as a paſſive receptacle. But this idea has been controverted; at leaſt it has not always been admitted in the extent here ſtated. Arguments founded on analogy have been adduced to prove, that it poſſeſſes ſome active power on its own contents; and that, though aſſiſted

by the preſſure of adjacent parts as acted upon by the diaphragm and abdominal muſcles, yet, that there is inherent in it, a power by which it co-operates with thoſe agents, and relieves itſelf from any accumulation.

20. THE analogy here alluded to, is that of the urinary bladder, which, by its own muſcular power, is able to evacuate its contents.

21. DILIGENT ſearch has been made by anatomiſts to diſcover muſcular fibres in the gall-bladder; and ſuch fibres have been deſcribed, but their preciſe direction is not yet agreed upon. This difference of opinion, though it does not diſprove their exiſtence, yet weakens the probability of it; for, an appear-

ance ſo equivocally and indiſtinctly marked as to admit of a diverſity of deſcription, divides the mind too much to favour any doctrine on the ſubject.

22. This difficulty has induced anatomiſts to adopt another criterion of muſcularity, viz. *irritability;* and experiments have been inſtituted, with a view either to eſtabliſh or to diſprove its preſence. Various ſtimulating powers, both chemical and mechanical, have been applied to the gall-bladder, without producing any evident contraction. Mechanical *ſtimuli*, indeed, produce no effect; and when any contraction has followed the uſe of chemical applications, it has been confined to ſuch as acted by a corroding quality; and

the apparent contraction has been nothing more than the corrugation which may be induced on inanimate animal matter. Upon this ſubject the experiments of Baron Haller appear to be ſufficient and deciſive.

23. HAVING explained the powers by which the bile is conveyed from the liver and the gall-bladder into the duodenum, we are naturally led to contemplate the means by which its return from the duodenum is prevented.

24. THE contrivance is ſimple and effectual. It conſiſts of nothing more than the oblique manner, in which the common biliary duct paſſes through the coats of the inteſtine, from the external

to the internal ſurface, and by which the office of a valve is performed; ſo that while the bile has a free paſſage from without inward, the orifice of the duct collapſes when a contrary direction is attempted.

25. The cauſes which impede the flow of bile in to the *duodenum*, are generally very tranſient in their operation, during which there is only a moderate ſurcharge of the ducts, and no material inconvenience enſues. But it not unfrequently happens, that the obſtruction is of a permanent nature; in which caſe the bile is neceſſarily detained in theſe parts for a time; after which, it finds its way into the maſs of blood, where, by being circulated through

every part of the body, it gives yellowneſs to the ſkin, and produces jaundice.

26. THE cauſes which occaſion this obſtruction are various. A very common one is, the preſence of a gall-ſtone either in the hepatic or common duct; perhaps the latter is more general, as biliary *calculi* form more frequently in the gall-bladder, where the bile is in a ſtate of quieſcence, than in the branches of the hepatic duct, where it is in motion.

27. SOMETIMES a ſtricture of the common duct is an obſtructing cauſe; ſuch as have been diſcovered after death, are uſually of that permanent kind connected with a diſeaſed condition of this

part, a removal of which can ſcarcely be hoped for.

28. But a cauſe of jaundice has been referred to a ſpaſmodic ſtricture of this duct, and which, as not being connected with a change of organization, may attack by paroxyſms, returning at indeterminate periods.

29. Without examining into the ſymptoms which have been ſuppoſed to characterize this cauſe, it may poſſibly be thought a ſufficient refutation to prove, that the biliary ducts of a living animal poſſeſs no marks of irritability when acted upon by *ſtimuli*; the contrary of which we ſhould expect were they furniſhed with muſcular fibres.

The only part of the common duct

liable to ſpaſmodic affection, is that which paſſes through the coats of the *duodenum*, which may be acted upon by the muſcular fibres of that inteſtine; and here we ſhould diſtinguiſh between the contraction of the inteſtine in which the biliary duct is paſſive, and a contraction of the duct itſelf.

30. ANOTHER cauſe of obſtructed bile conſiſts in a preſſure of the duct by the head of the *pancreas*, which is ſometimes found in a ſcirrhous ſtate, and which, from its connection, may eaſily produce ſuch an effect: for the biliary duct, a little before it terminates in the inteſtine, penetrates ſome way into the ſubſtance of the *pancreas*, and receives the excretory duct of that gland. There-

fore the orifice which appears on the inner ſurface of the *duodenum* tranſmits, in common, the bile, and the pancreatic fluid.

31. To the cauſes of obſtruction already enumerated, there is another ſometimes annexed; viz. a ſchirrous impacted ſtate of the liver, which from a very extenſive depoſit of ſolid matter* throughout its ſubſtance, in an interſtitial form, diminiſhes the capacities of

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* The nature of this matter has not been aſcertained. Does it bear any reſemblance to the ſperma-ceti-like matter into which the liver is almoſt entirely changed by long expoſure to the air? *See Annales de Chymie, tom.* 3. The queſtion might perhaps be determined by expoſing equal weights of ſound liver, and of one diſeaſed in this way, to the influence of the air, or of running water, and obſerving which underwent the change quickeſt, and yielded the largeſt portion of the matter in queſtion.

the *pori biliarii*, ſo that they are unable to carry off the bile as faſt as ſecreted, and an accumulation of it within the ſubſtance of the liver muſt therefore neceſſarily enſue.

32. HITHERTO the cauſe of jaundice has been referred to obſtruction in ſome part or other of the biliary ducts. But there are ſome caſes which incline us to believe, that jaundice may exiſt, though the biliary canals are pervious and free.—The ordinary yellow fever of the Weſt Indies furniſhes an inſtance in point.* The characters of this com-

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* I have uſed the word *ordinary* here, to denote the endemic fever of theſe iſlands, that has been long known and well deſcribed; for it appears from the accounts of ſome late writers, who have accurately deſcribed the dreadful fever which has ravaged our fleets and armies in the Weſt Indies this war, that the yellowneſs

plaint are, a diffuſion of bile through the maſs of blood, producing jaundice; with an exceſſive quantity of it in the alimentary canal, ſo that it is diſcharged by vomiting and purging. In this caſe, jaundice ſeems to depend upon a redundant ſecretion.

33. BUT *Boerhaave* and *Morgagni* have favoured an opinion the direct reverſe of this. They conſider jaundice, ſometimes, as the effect of a ſuſpended ſecretion, and ſuppoſe that the blood, in conſequence of this, retains a bilious

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does not, as former authors had deſcribed in their accounts of the endemic of the country, begin firſt in the eyes, but in ſtreaks about the mouth and neck; and ſeems to depend rather upon a particular ſtate of the lymph in the cellular ſubſtance of theſe parts, than upon the abſorption of bile into the circulating maſs.

character, thereby giving a yellowneſs to the ſkin.*

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* Though there is no reaſon to believe this in the inſtance of common jaundice, which is univerſally, I believe, found to depend upon ſomething that prevents the bile *when formed*, from getting into the duodenum; yet, from late experiments it would appear probable, that, under certain morbid ſtates of the body, the blood *may* acquire a bilious appearance, independant of abſorption or regurgitation from the liver. M. M. Fourcroy, and Vauquelin found, that on coagulating, by means of fire, arterial ox-blood mixed with one-third its weight of water, there ſeparated from the coagulum, a liquid, which, by a careful evaporation, afforded a matter ſo much like ox-gall, that many perſons, without any previous information, have recognized in it the ſmell, colour, and taſte of the ſecreted fluid: and a ſimilar reſemblance in every reſpect was ſhewn by chemical analyſis. *(Ann. de Chymic, tom. 6. p. 181.)* It would be well worth while to try, whether venous blood would not yield this matter in greater quantity than arterial blood, and whether blood taken from the vena portarum, would not yield it in ſtill greater quantity than either. If this laſt were proved by experiment to be the caſe, it would at once point out the reaſon why the liver is ſupplied with blood, which is perhaps more completely deprived of its arterial character than any other in the body.

34. This opinion is founded on a miſtaken notion, that all the ſecreted fluids pre-exiſt in the maſs of blood; and that the province of the different glands is confined to the mere mechanical ſeparation of thoſe fluids.

35. As there are few, if any, phyſiologiſts of the preſent day, who entertain ſuch an opinion of glandular ſecretion,—to offer any thing of an argumentative nature, by way of refutation, would be altogether ſuperfluous. It is now generally underſtood and believed, that the blood is the *pabulum* or ſource of all the ſecretions, and that the glands through which it circulates, change its properties, every one according to its peculiar mode of action; ſo that the

ſecretions may be conſidered as new fluids formed by their reſpective glands.

36. If this idea of ſecretion be true, it muſt neceſſarily follow, that, if the action of the whole ſecreting ſyſtem of the liver be arreſted, no bile can be formed, and conſequently none can be conveyed into the maſs of blood. To argue otherwiſe would be to oppoſe every principle of reaſoning; it would be imputing effects to a cauſe which has no exiſtence.

37. In every caſe of jaundice bile muſt be ſecreted and carried into the blood-veſſels; but the channel by which it is conveyed has given riſe to controverſy.

38. There are on this ſubject two

opinions which divide phyſiologiſts; ſome of whom aſſert, that the bile after ſecretion, is carried to the blood-veſſels by regurgitation, whilſt others attribute this effect to abſorption.

The firſt opinion has moſt generally prevailed.

39. BARON HALLER, who introduced this to our notice, reſts his opinion on the free communication of veſſels in the interior part of the liver; but more eſpecially on a communication between the hepatic veins and biliary ducts. The proof of this communication is fair and deciſive.

40. HE obſerves, that a ſubtile injection thrown in by the hepatic duct, will eſcape readily by the hepatic veins.

This is a fact; and I know from experiment, that water injected in the ſame direction, will return by the veins in a full ſtream, though very little force is uſed. From the facility with which water takes this retrograde courſe, a probability ariſes, that if from any cauſe the natural direction of the bile be obſtructed, it will readily obey the ſame direction.

This explanation of jaundice ſeemed fully ſufficient to ſatisfy the mind of Baron *Haller*.

41. BUT a more extenſive acquaintance with the economy of the abſorbent ſyſtem, has given a new turn to this ſpeculation, and has induced a phyſiologiſt of the preſent day, to ſolve the

cauſe of jaundice on the principle of abſorption only. This opinion reſts on an experiment where the hepatic duct of a living animal was tied, and afterwards the abſorbents of the liver were very much loaded with bile.

42. This fact certainly proves that the abſorbents have the power of taking up bile; a circumſtance which I apprehend would be generally admitted, though it had not received the confirmation of experiment. But it does not invalidate the probability of a portion of bile paſſing into the blood-veſſels by the hepatic veins: the circumſtances and facts upon which that opinion reſts, retain all their original force, and ſtand unaffected by this experiment.

43. THE queſtion then ſeems to be, whether in caſes of jaundice the bile paſſes into the blood-veſſels by regurgitation, by abſorption, or by both modes?

44. THAT the abſorbents take up the bile from the interior part of the liver, and convey it by the thoracic duct into the maſs of blood, the following experiment will evince.

EXPERIMENT.

45. AN inciſion was made into the abdomen of a living dog, large enough to allow a ligature to be made on the hepatic duct; this being done, the *parietes* of the *abdomen* were brought together by ſutures. Two hours after,

the dog was ſtrangled, and the parts carefully examined. On inſpection it appeared, that the abſorbents had been very active, for they were very much diſtended with a fluid of a bilious colour, and their courſe, which was very conſpicuous, could be traced with the greateſt eaſe to the thoracic duct, the contents of which ſeemed only moderately bilious. The bilious colour was in a great meaſure concealed by the red particles of blood, which had been extravaſated by the injury, taken up by the abſorbents, and conveyed into that canal. It is probable, however, that the bile was only juſt entering the blood-veſſels, as on a very careful inſpection of the eye, the tunica conjunctiva did not betray the ſlighteſt appearance of jaundice.

46. It ſeems then, that during the ſpace of two hours, the ſecretion of the liver had been ſufficient in quantity to diſtend its ducts,—to ſtimulate the abſorbents to relieve that diſtention, and to allow of a ſmall portion of their contents to be conveyed into the blood-veſſels.

47. But it ſtill remained for determination, whether or not a ſmall quantity of bile was not regurgitating by the hepatic veins during the proceſs.

48. To aſcertain this, a ſecond dog was procured, and a ligature made on the hepatic duct as in the preceding experiment. Two hours after, blood was taken from the jugular vein, and

ſet to reſt, in order that it might ſeparate into its *ſerum* and *craſſamentum.* The liver was then drawn down a little from the diaphragm, and blood taken from one of the hepatic veins. This blood, as well as the former, was allowed to ſeparate into parts: and on immerſing pieces of white paper into the *ſerum* of each, *that* taken from the hepatic veins gave the deeper tinge, the *other* produced only a very ſlight degree of diſcoloration.

49. In this experiment, the period of examination was the ſame as the laſt, viz. two hours; a ſpace of time juſt ſufficient for the bile to begin to make its way into the circulation, without getting in in ſuch quantity as to tinge

in any ſenſible degree the general maſs of blood. Hence we ſee evidently, why the blood which was returning from the liver by the hepatic veins, contained a larger proportion of bile than that taken from the general circulation.

50. As the firſt of theſe experiments proves, that the abſorbents of the liver are concerned in the production of jaundice, ſo the laſt demonſtrates with equal force, that when from the operation of any obſtructing cauſe the bile is accumulated in its ducts, ſo as to diſtend them in a conſiderable degree, Nature relieves herſelf, in part, by allowing a portion of it to take a retrograde courſe by the hepatic veins.

CHAP. VII.

BILE.

SECT. I.

Bile appears to the eye a perfectly homogeneous fluid, of a deep yellow or brown colour, which is changed to a bright yellow by dilution with water. The cyſtic bile indeed, is frequently green, and ſometimes ſo conſiderably ſo, as to appear almoſt black; but even this when diluted, exhibits more or leſs of a yellow hue. Hence it is, that this fluid, when carried into the blood, and diffuſed through the *ſerum*, occaſions the yellowneſs in jaundice.

2. THE conſiſtence of bile is uſually viſcid, and its tenacity is ſometimes ſuch, that it cannot be poured from a phial in drops, but is drawn out into threads like the *albumen*. It is obſerved to be more viſcid in the human ſubject, than in brute animals.

3. BUT a queſtion may here ariſe, how far this tenacity is eſſential to the bile, or whether it may not be explained on the principle of its being a compound fluid, conſiſting in part of bile, with a portion of that mucus which is ſecreted by the gall-bladder; for it is

the bile contained in this receptacle, which is uſually the ſubject of chemical experiment.

4. WHEN bile is agitated in a phial, it forms a lather like that from ſoap and water; and that it really poſſeſſes ſaponaceous properties, is rendered highly probable from the uſe to which it is applied by the ſcourers of cloth; it being known to aſſiſt very powerfully in the removal of greaſy ſpots.

5. To theſe ſenſible properties we may add its *taſte* and *ſmell*; the firſt being intenſely bitter, with a degree of pungency; the laſt of a faint and nauſeous kind.

6. FROM this aſſemblage of properties, we naturally preſume, that bile is

a ſaponaceous fluid, combined with a mucilaginous ſubſtance from which it receives its tenacity; and to theſe are ſuperadded—the colouring matter, and the principle of bitterneſs.

7. It is therefore the province of chemiſtry to determine, by careful and accurate inveſtigation, in what degree theſe conjectures concerning the nature of that fluid, can be confirmed by experiment.

8. In the firſt dawnings of chemical knowledge, when our acquaintance with the agents of chemiſtry, and their effects on matter, was narrow and confined, the means uſually employed to aſcertain the componant parts of bodies, were ſeldom any other than thoſe of

ſubjecting them to diſtillation, by different degrees of heat from the leſs violent to the more intenſe. Having exerted the whole power of the furnace in this way, the inquirers thought themſelves in poſſeſſion of a very perfect *analysis* of every body which they thus ſubmitted to inveſtigation.

9. BUT reflection and an extended ſtate of knowledge at laſt convinced them, how remote they were from a thorough acquaintance with the conſtituent parts of bodies; and their unſucceſsful attempts to reproduce the original ſubſtance, by a recombination of ſuch of its elements, as they, in this way, were able to collect, ſoon convinced them, that another, and leſs fallible mode of

proſecuting theſe inquiries, was very much to be wiſhed for.

10. BESIDES, they were not acquainted with the nature of the agent they employed, either abſtractedly, or in a ſtate of combination with matter; therefore the changes thus induced, could be but imperfectly underſtood.

11. To guard againſt this difficulty, another and more natural mode of inveſtigating bodies was introduced, viz. the forming of different compounds by the addition of certain chemical reagents; and in this way it was found, that a more correct analyſis could be obtained. Thus the torturing of bodies, by the application of *heat*, neceſſarily

yielded to the more natural examination by chemical attractions.

12. It is by no means intended here to proſcribe altogether the agency of *heat*, it being often found eſſentially uſeful, as an auxiliary to the chemical bodies employed; enabling them the better to effect their different decompoſitions and combinations.

13. A quantity of *recent ox bile* being procured, ſeveral experiments were inſtituted, with a view to aſcertain its component parts.

EXPERIMENT I.

14. A portion of it, being received into a ſhallow earthen veſſel, was eva-

porated cautiouſly by a moderate heat. On examining the vapour, it appeared to be principally water poſſeſſing neither acid nor alkaline properties, but ſtrongly impregnated with that principle in which the peculiar odour of bile chiefly reſides. The *reſiduum* gradually inſpiſſates and aſſumes the form of an extract; which, if the evaporation be carried ſufficiently far, will become as brittle as reſin, and may be pulverized with equal eaſe.

15. FROM this experiment we learn, that the fluidity of bile depends chiefly on *aqueous* matter; and that in the exhalation of it, even by the more moderate degrees of heat, it is accompanied

by the odorous principle, which, it ſeems, is of a very volatile nature.

16. As bile poſſeſſes a conſiderable degree of tenacity, and as the tenacity of animal fluids depends chiefly on a mucilaginous principle, it was determined next to aſcertain, whether that principle gives viſcidity to the bile.

EXPERIMENT II.

17. On a portion of bile was poured a quantity of alcohol; *a coagulum* was immediately formed, which floated in a green liquor. On filtering this compound, the green fluid readily paſſed, while a mucilaginous ſubſtance of conſiderable tenacity, was detained by the

paper. This mucilage was of a whitiſh colour, and poſſeſſed only a ſlight degree of bitterneſs, while the filtrated liquor preſerved both the bilious colour and taſte. It is ſcarcely neceſſary to add, that it was free from viſcidity. The GLUTINOUS principle of the bile then appears to reſide in an animal mucilage.

18. THE *fluidity*, *odour*, and *viſcidity* of bile being thus accounted for, we are next led to the inveſtigation of the principles on which its *bitterneſs*, *colour*, and *ſaponaceous quality*, depend.

EXPERIMENT III.

19. To a quantity of recent bile, was added a diluted marine acid; a coagulation was produced. The fluid ſeparated by the filter was of a green colour, but much lighter than that of bile; and, notwithſtanding the predominance of the acid, the bitter taſte was very diſtinguiſhable.

20. The more ſolid matter detained by the filter, was very glutinous, of a green colour, and intenſely bitter.

EXPERIMENT IV.

21. Two other portions of bile were put into proper veſſels; to one was

added a diluted vitriolic, to the other a diluted nitrous acid. Both exhibited *phenomena* ſimilar to thoſe in the laſt experiment. The filtrated liquors were green and bitteriſh; the *coagula* intenſely ſo, and glutinous.

22. As, in theſe experiments, the decompoſition appeared to be incomplete, it was thought eligible to try, whether or not a more perfect ſeparation might be obtained by the aſſiſtance of heat.

EXPERIMENT V.

23. A QUANTITY of bile and diluted marine acid were put into a flaſk, and placed in a ſand bath until they had acquired the boiling heat. On inſpection,

the ſeparation into parts was very evident; and on committing it to the filter, it ſeparated a colourleſs fluid deſtitute of every bilious property. The *reſiduum* conſiſted of a very dark green maſs, intenſely bitter, and extremely glutinous. When examined, it appeared to be compoſed of an animal mucilage, in combination with a reſinous ſubſtance.

24. BUT to aſcertain in what way the acid had effected the decompoſition, it became neceſſary to examine the filtrated liquor. It was therefore ſubjected to a cautious evaporation, and, at a proper period, was ſuffered to cool.

25. UNDER cooling, cryſtals were formed of a cubic figure, which decre-

pitated by heat, and poſſeſſed all the characters of common ſalt.

Therefore, the decompoſition was here occaſioned by the marine acid engaging the mineral alkali, which it ſeparated from the other element of the ſaponaceous body, and, by uniting with that *baſis*, formed common ſalt.

26. But, notwithſtanding we are able to account for the production of common ſalt in this way, it does not exclude the poſſibility of a ſmall quantity of it pre-exiſting in the bile, independent on this artificial combination of its elements.

27. To ſatisfy my doubts on this point, the following experiment was made.

EXPERIMENT VI.

28. To a portion of bile was added alcohol, in quantity ſufficient to ſet looſe all its mucilaginous matter. The fluid part, being ſeparated by a filter, was examined by nitrated ſilver, but no *luna cornea* was produced: therefore the marine acid does not appear to have any exiſtence in the bile.

29. From this experiment we learn, that the ſaline *baſis* of the ſaponaceous matter of the bile, is the mineral alkali; but the other element is ſtill a queſtion.

EXPERIMENT VII.

30. To determine this point a quantity of bile was decompoſed by a diluted marine acid, aſſiſted by heat (as in Experiment V.) The *coagulum* detained by the filter was examined. It appeared to poſſeſs moſt of the characters of bile in a ſolid concentrated ſtate. It had a pungent bitter taſte, dark green colour, and was extremely glutinous. When perfectly dry, it was very inflammable, and burned with as much rapidity as any bituminous ſubſtance would do.

31. This appearance led to a ſuſpicion of the preſence of a reſin, but as a higher degree of certainty was ſtill

wiſhed for, further experiment was neceſſary.

EXPERIMENT VIII.

32. I THEREFORE diffuſed a portion of this *reſiduum* through rectified ſpirit of wine: a large proportion of it was diſſolved, which imparted to the ſpirit both the colour and taſte of bile; the inſoluble part being chiefly of a mucilaginous nature.

33. FROM the facility with which alcohol diſſolves the green and bitter part, it is ſcarcely probable, that it partook of the nature of an unctuous oil; but that it was either a reſinous body, or a kind of eſſential oil.

34. This point was eaſily determined; for, on the addition of water to the ſolution, a precipitation took place. The filtered liquor was colourleſs, and free from bitterneſs. The *reſiduum* was nothing more than a reſinous ſubſtance, in which reſided both the colouring principle and bitter taſte.

35. On taking a retroſpect of the above experiments, the bile appears to be reſolvable into the following elements, viz.

35. Firſt,—Water, impregnated with the odorous principle.

Secondly,—A mucilaginous ſubſtance reſembling the *albumen*.

Thirdly,—A reſinous ſubſtance containing the colouring principle and bitter taſte. And

Fourthly,—The mild mineral alkali.

36. WITH reſpect to their combination, it ſeems that the ſaponaceous matter conſiſts of the bitter reſin in union with the alkali: this admits of a ready union with a mucilage, and with this again the aqueous matter very readily combines, ſo that the whole forms a maſs apparently homogeneous.

37. THE following experiments were inſtituted, with a view of examining ſome doctrines, founded on the bile having a greater power of reſiſting putrefaction than the blood.

EXPERIMENTS IX. & X.

38. EQUAL quantities of blood and bile of the ſame ox were each put into a different veſſel of the ſame ſize, and expoſed to the ſame degree of heat. On the third day the blood began to give out, by its odour, marks of putrefaction; the bile remained in its natural ſtate.—On the fourth day the bile had a pungent odour by no means ungrateful, while the blood was extremely putrid. On the ſixth day the bile became putrid, and had a very offenſive ſmell. Hence it appears, that the bile in a healthy animal is leſs diſpoſed to putrify than the blood.

CHAP. VIII.

ON BILIARY CALCULI.

SECT. I.

Being favoured by Dr. Baillie, with an opportunity of examining the ſtructure and general appearance of biliary *calculi* in his collection, I found that they are very generally either of a lamellated or radiated ſtructure: on the outer ſurface chiefly of the former; on the inner of the latter. The colour is extremely various: in ſome they are of a light colour, approaching to a white, in others as black as jet; in many of a brown or ochry appearance: theſe laſt have generally a very bitter taſte; the radiated part is frequently white, and without taſte.

2. THEY are, very generally, inflammable, and fuſible in the fire; and, for the moſt part, they are ſoluble in ſpirit of wine, and oil of turpentine. There are ſome, however, which are not ſoluble in either of theſe fluids. Many of them have the conſiſtence of *phoſphorus*, and cut like wax.

3. IN the radiated *calculi* there is a ſubſtance, in every reſpect like *ſpermaceti*. Some *calculi*, inſtead of burning

with a flame, only become red, and conſume to an aſh, like a cinder.

4. THIS variety in the appearance of calculi clearly evinces that they are not mere inſpiſſations of bile, but that there is a difference either in the component parts themſelves, or in the proportion of thoſe parts.

5. THEREFORE, in chemical inveſtigation, it ſeems neceſſary that experiments ſhould be made on different ſpecimens; as it is probable, even *a priori*, that the reſult of experiments made on one ſpecimen, will not apply very ſtrictly, to a ſeries of inquiries made on another.

6. As we preſume, from bare inſpection, that theſe calculi are not mere

inſpiſſations of bile, but that they contain principles which are not to be found in that fluid, it affords a ſubject of rational inquiry to determine—what are thoſe elements, and of what nature is their combination?

7. To aſcertain this, ſeveral experiments were inſtituted on a calculus of the following characters.

The external ſurface was of a chocolate colour; when rubbed off, it had a lighter coloured layer underneath.

On making a ſection through its centre, it appeared to be compoſed of lamellæ.

It was rubbed to powder very eaſily.

Its taſte was moderately bitter.

It was fuſible by heat, and when inflamed, burned like a reſinous ſubſtance.

Ol. terebinth. unaided by heat, diſſolved a very large portion; but alcohol, under the ſame circumſtances, diſſolved only a ſmall part.

8. To determine how far the agency of heat could aſſiſt the ſolvent power of alcohol, an experiment was made.

EXPERIMENT.

TWENTY grains of this calculus were infuſed in an ounce of alcohol, and, after previous agitation, the phial was placed in a ſand bath. Before the fluid had arrived at the boiling point, it diſſolved nearly the whole of the ſubſtance. The clear liquor, being poured from the reſiduum, was ſuffered to cool. Under cooling, the whole aſſumed the appearance of a ſolid cryſtallized maſs.

EXPERIMENT.

9. A SMALL quantity of alcohol being poured on this reſiduum, and aſſiſted by heat as before, exhibited very little ſolvent power. Theſe experiments ſhew, that there is a ſmall proportion of this biliary calculus, which reſiſts the ſolvent power of alcohol. What is its nature?

EXPERIMENT.

10. To this reſiduum was added a quantity of diluted Muriatic Acid. A

ſufficient time having elapſed, the fluid was committed to the filter. To the clear liquor was added a portion of the Aq. Kali, when a white precipitation, apparently of an earthy nature, immediately took place.*

Hence one point in which a biliary calculus differs from fluid bile, is, in containing a quantity of earthy matter.

11. THE cryſtallized maſs formed by the alcohol, was next ſubjected to examination. Some of the phenomena already related, having led to a ſuſpicion, that a reſinous matter forms one of the conſtituent parts of biliary calculi,

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* I ſuſpect it to be of an earthy nature, not only from its ſolubility in an acid, but from its poſſeſſing no inflammability.

the proof of it was reſerved for the following experiment.

EXPERIMENT.

12. The cryſtallized maſs, being made fluid by heat, was poured into a pint of water; a white flocculated precipitate was immediately formed, leaving an opaque ſupernatant liquor. The whole was committed to the filter, and the ſolid part being collected and dried, was found to be of a reſinous nature.

EXPERIMENT.

13. To the clear filtered liquor was added a ſmall quantity of diluted marine

acid, from a ſuſpicion that an alkaline principle might form one of the conſtituent parts of a gall-ſtone, as well as of the bile, and by that means a ſmall portion of the reſinous ſubſtance might ſtill be held in ſolution; but no precipitation followed. This experiment makes the preſence of an alkali ſomewhat equivocal; but the following proved its exiſtence very ſatisfactorily.

EXPERIMENT.

14. THE fluid mixture of the laſt experiment was carefully evaporated almoſt to dryneſs. On cooling, two kinds of cryſtals formed; one ſpiculated, the other cubic. The cubes poſſeſſing the characters of common ſalt,

proved the preſence of the mineral alkali: and the ſpiculated cryſtals, which were the common crude ſal ammoniac, afforded preſumptive evidence in favor of the volatile alkali. But what placed the matter beyond doubt, was the following experiment.

EXPERIMENT.

15. A drop or two of Aq. Kali was added to theſe cryſtals, and the volatile alkali became immediately ſenſible.

16. From theſe experiments we infer, that this ſpecimen of biliary calculus conſiſted chiefly of a reſinous matter, with a ſmall proportion of earth, apparently calcareous, combined with the mineral and volatile alkali.

CHAP. IX.

OF THE USE OF THE BILE.

SECT. I.

GREEN and bitter bile being in common to all animals with red blood, and found only in ſuch, makes it probable that there is ſome relative connexion between this fluid and the colouring matter of the blood, by the red particles contributing more eſpecially to its formation. An opinion very generally prevails, that the bile aſſiſts in the proceſs of chylification, by mixing with the digeſted food contained in the *duodenum:* for it is demonſtrably true, that the digeſted matter does not aſſume a chylous form until it has paſſed below that part of the inteſtine where the biliary and pancreatic ducts make their entrance. Upon the ground of this fact, it has been preſumed, rather than demonſtrated, that either all, or ſome of the conſtituent parts of the bile contribute to chylification. What foundation exiſts for ſuch an opinion, the following experiment will tend to ſhew.

EXPERIMENT.

2. A DOG was fed with animal food, and in three hours the *abdomen* was opened.—A portion of the *duodenum* and *jejunum*, of conſiderable length, was cut open, ſo that the contents might be obſerved. Portions of food, reduced to a pultaceous maſs, were ſeen oozing through the *pylorus*; the bile was likewiſe obſerved to paſs ſlowly out of its duct, which, when carefully attended to, appeared to flow over the ſurface of the digeſted matter adhering to the inteſtine. Upon removing the bile from the ſurface of this digeſted matter, it did not appear to have mixed with it in any ſenſible degree.

3. HENCE it ſeems ſomewhat doubtful, whether the bile really forms one of the conſtituent parts of the chyle, as has been imagined, or not. If, however, all, or any of the elements of bile do contribute to chylification, no traces of their preſence can be diſcovered from the ſenſible properties of the chyle.

4. ANOTHER difficulty in admitting this as one uſe of the bile, is, from the circumſtances of jaundice. In this complaint, the paſſage of that fluid into the inteſtine is either completely obſtructed, or very much impeded; but there are no ſymptoms which clearly manifeſt a defect of chylification.

5. ONE important uſe of the bile is,

unqueſtionably, that of ſtimulating the inteſtine, and performing the office of a purgative; for when the excretion is impeded, as in the jaundice, the inteſtines, being deprived of their natural *ſtimulus*, become torpid, and coſtiveneſs enſues.—This torpor is diffuſed by ſympathy over every part of the ſyſtem, and langour and laſſitude prevail.

6. It is probable, therefore, that even admitting the bile to contribute ſomewhat to the digeſtion and aſſimilation of our food; its principal office is that of a natural and habitual *ſtimulus* to the inteſtines, keeping up their energy and periſtaltic motion, which may be affected either by an increaſe of its quantity, or

a change in its quality, produced by diſeaſe.

When however, we take a view of the conſtituent parts of bile, as clearly aſcertained by the foregoing chemical experiments, it ſeems very probable, that from its reſinous bitter, it may counteract any active and ſpontaneous changes to which animal and vegetable matter would otherwiſe be ſubject; and that, as the propenſity to acidity in our vegetable aliment is extremely obvious, the alkaline matter of bile tends to correct it. Bile likewiſe, from its ſaponaceous and ſoluble quality, leſſens the adheſive nature of our fœces, and, by ſmoothing their ſurface, promotes their evacuation. In caſes of its defective ſecretion, the fœces are hard, knotty, and irregularly fixed. One important part of digeſtion is ultimately perfected in the upper end of the duodenum; and as perfect digeſtion is always oppoſed to fermentable changes, the bile is well calculated to finiſh that proceſs. We probably may err in confining the uſe of bile, therefore, to any ſingle operation, while from its nature it ſeems ſo well qualified to anſwer a variety of uſeful purpoſes in the animal economy. We ſhall afterwards obſerve, that where it is defective, its place may be ſupplied by artificial means with advantage; and in no inſtance has the application of chemiſtry to the cure of diſeaſes appeared more ſucceſsful, than in ſuggeſting the uſe of proper remedies in caſes of diſeaſed and defective bile.

It frequently happens that bile is ſecreted in too ſmall a quantity; as in hypochondriacal complaints, and in chloroſis: in which diſeaſes an unuſual degree of torpor takes place, expreſſed in the one caſe by dejection and deſpair; in the other by inactivity and languor; the ſtools are generally of a light clay colour, and the body is coſtive.

Bile, therefore, affords a ſtimulus by which tone and energy are communicated from the inteſtines to the whole body, and the defect of it in the primæ viæ, is more productive of diſeaſe than its exceſs. In the latter caſe, if it be healthy in its nature, it only proves a ſalutary purgative, but if in a diſeaſed ſtate, it deranges the animal economy like any other foreign ſtimulus which may be applied to the inteſtines.—It likewiſe, from its bitterneſs, poſſeſſes antiſeptic powers, which are peculiarly uſeful in the inteſtinal canal.

OF THE DISEASES OF THE LIVER DEPENDING ON ITS FUNCTIONS AS AN ORGAN OF SECRETION.

CHAP. I.

ON THE INCREASED SECRETION OF BILE.

SECT. I.

THE Inhabitants of warm climates are extremely ſubject to diſeaſes ariſing from the increaſed ſecretion of bile, and the exceſs of its quantity in the primæ viæ, which, either by regurgitating into the ſtomach, produces a general languor of the body, together with *nauſea*, foul tongue, loſs of appetite, and indigeſtion; or, by being directed to the inteſtines, excites a painful diarrhœa, ultimately tending to weaken their tone, and diſturb their regular periſtaltic motion. It generally happens that, during the exceſs and prevalence of bile in the firſt paſſages, ſome abſorption of it takes place into the habit, ſo that the ſkin becomes yellow, and the urine is ſenſibly impregnated with it. The pulſe is quicker than natural, and there is a conſiderable degree of thirſt, with an increaſe of heat; the uſual ſymptoms of fever. The body becomes emaciated, and the general aſpect of the patient is extremely unhealthy.

2. UNDER ſuch circumſtances, a change of climate becomes neceſſary; by which the ſecretion of bile is gradually diminiſhed, its powers, perhaps, rendered leſs active, and the healthy functions of the ſtomach and bowels are again reſtored. A ſea voyage from a warm to a colder climate generally effects this purpoſe, ſuppoſing, as is frequently the caſe, that the liver and other abdominal viſcera are in a ſound ſtate.

3. SUCH ſymptoms as I have now enumerated, are the ſpontaneous effects of a warm climate on healthy conſtitutions, independently of any intemperance; and cannot always be prevented by the moſt careful attention to diet, or

by avoiding ſuch irregularities as, in all ſituations, contribute to produce diſeaſe.

4. The natives of warm climates are leſs ſubject to inconveniences ariſing from the increaſed ſecretion of bile than Europeans who inhabit thoſe countries. This may, no doubt, depend in ſome degree upon the effect which habit produces, in diminiſhing the inconvenience ariſing from the ſtimulus of heat. But I conceive that the difference in queſtion may be chiefly referred to other cauſes. In page 147, I have mentioned it as probable, that there exiſted ſome connexion between the bile and the red particles of the blood. Now, that ſuch a connexion does exiſt, and that both the quantity and activity of the bile

ſecreted, is, *cæteris paribus* proportioned to the abundance of red particles in the blood, appears to be proved by the following conſiderations. The perſons who, of all others, are moſt ſubject to a redundance of bile, are thoſe who have black hair, a ruddy complexion, and ſtrong fibre; and theſe are alſo the perſons who have the richeſt blood, or that blood in which the red particles are moſt numerous. On the contrary, thoſe who ſecrete leaſt bile, are ſuch as have a pale exſanguious complexion, ſoft hair, and lax fibre; in whom the ſanguific powers are very weak: the moſt exquiſite example of this habit is ſeen in chlorotic females. The influence of diet in forming blood rich or poor in red particles, is well known; and it is equally certain, that animal food contributes moſt to the former, while vegetable food is chiefly productive of the latter ſtate of the circulating maſs: the florid complexion uſually obſervable in butchers, oppoſed to the pallid hue for which bakers are equally remarkable, will not, perhaps, be thought the leaſt ſtriking among the proofs that might be adduced of this fact. The effect of aceſcent diet (of which kind moſt vegetables are) in leſſening the red globules of the blood, is ſtrikingly illuſtrated by the pale and watery ſtate of it occaſioned by the large uſe of vegetable acids; as in the caſe of young women, who by this pernicious practice (often to the entire ruin of their conſtitution) very ſoon exchange the plumpneſs and bloom of ruſtic health, for the ſlender ſhape and languid paleneſs which accord with their miſtaken notions of faſhionable beauty.

Let us now compare theſe circumſtances with thoſe which reſpectively attach to reſident Europeans, and to the natives of hot climates where bilious diſorders are moſt frequent, as for example in India.—The European carries with him to India a richer blood, and a more tenſe muſcular fibre than is poſſeſſed by the natives of that country; he is therefore, in conſequence of the mere heat of the climate, diſpoſed to generate bile in larger quantity, and of a more active quality, than the other. But if to this we add, that as long as his health will permit him, he continues to live on a full diet of animal food, malt liquors, and wine, which ſtill farther augment the rapidity of circulation, and conſequently increaſe the flow of blood through the liver,—we can readily ſee why in ſuch a perſon, the redundancy and acrimony of the bile will be much greater than in the native, who, beſides having a thinner blood and leſs tenſe fibre, drinks ſcarcely any thing except water, and lives upon a diet compoſed almoſt entirely of vegetable matter, and that matter one of the leaſt nutritious perhaps that man is capable of ſubſiſting upon, viz. rice.—

When, however, the original vigour of the European's conſtitution is broken down by repeated attacks of bilious remitting fever, &c. and his blood becomes impoveriſhed in proportion, then the bile is ſecreted in leſs quantity, as well as weaker in power; and this change is continued, perhaps even ſtill farther increaſed, by experience having taught him the neceſſity of abandoning his former mode of living, and having recourſe to a diet more nearly approaching that which the natives employ.

Cæteris paribus however, the bile in warm climates is, perhaps, more bitter and more ſaturated with its active component parts, than in colder countries;

it is therefore a more powerful emetic or purgative; and conſequently, even although it were not ſecreted in a larger quantity, its effects on the firſt paſſages would be more ſeverely felt.

5. We have had occaſion, in treating of the nature and properties of bile, to correct a common and prevailing opinion of its being extremely putreſcent: experiments, executed with great accuracy and fidelity, ſufficiently prove, that it is leſs diſpoſed to putrify than any other animal fluid; and that it even preſerves, in a ſweet ſtate, animal ſubſtances, which, when expoſed to ſimilar circumſtances of fluidity and heat without the admixture of bile, would in a ſhorter time have aſſumed the character

of putrefaction. It ſeems, therefore, to be a wiſe law of the animal economy, that in warm climates a larger quantity of this fluid ſhould be prepared by the conſtitution than in colder countries; and by its being more bitter and more active, it poſſeſſes a greater antiſeptic power than the milder and more diluted fluid of a colder climate; hence it is better fitted to correct and reſtain the propenſities to ſpontaneous and putrid fermentations, ſo extremely prevalent in warm climates.

6. I DO not, however, mean to deny, that many and great inconveniences are found to ariſe from the prevalence of bile in the primæ viæ; but I am firmly perſuaded, that a diminution of its na-

tural quantity would produce diſeaſes of a more permanent and alarming nature. It is more difficult to ſupply the defect in the quantity of this fluid, than to carry off its exceſs; it is even more eaſy to diminiſh its acrimony, than to increaſe its power, and thereby render it more active, and better ſuited to fulfil the various and important purpoſes which it is intended to anſwer in the animal economy.

7. I HAVE been frequently conſulted by perſons, whoſe appetite and digeſtion have been much diſturbed by a long reſidence in tropical climates; and who, although they have generally received much benefit by a ſea voyage, and a gradual return to Europe, yet require

the aſſiſtance of medicine, with a view to deſtroy the tendency to exceſſive ſecretion, and finally to reſtore ſtrength and vigorous action.

8. AFTER obtaining all the information which I ſuppoſe neceſſary reſpecting the conſtitution and habits of the patient, the original and progreſſive ſtate of ſymptoms, and the effects of ſuch remedies as have been employed, I proceed to aſcertain how far any local or organic affection of any of the viſcera has taken place.—If, upon inveſtigation, I find that the conſtitution has only ſuffered by the prevalence or the exceſs of bile, and that the diſpoſition to that morbid increaſe of ſecretion ſtill remains, diſturbing the functions of the ſtomach,

and irritating the bowels, I recommend it to my patient, every morning before breakfaſt, to dilute the contents of the ſtomach, by drinking from half a pint to a pint of water, of a temperature from 90 to 114 degrees of Farrenheit's thermometer, likewiſe to take a moderate degree of exerciſe before breakfaſt. I am perſuaded, that in this caſe water acts as a ſimple diluent; that tepid water dilutes better than cold water; and that pure water dilutes better than water impregnated with ſaline, earthy, or metallic matter.—I do not, however, mean to diſcourage invalids from going to places of public reſort, which may contribute, by their amuſements, to reſtore a conſtitution enfeebled by a warm climate, or intenſe application to buſineſs; nor ſhall I deny that mineral waters, ſuch as thoſe of Bath or Cheltenham, poſſeſs conſiderable powers in giving tone to weak ſtomachs, and in promoting neceſſary evacuations, by exerting a more regular periſtaltic motion of the inteſtines: a more intimate acquaintance with the power of Bath water, and a minuter enquiry into its ſenſible effects on the animal economy, having inclined me to think more favourably of its uſe, independently of its being merely an aqueous diluent.*

9. THE chemical analyſis, however, of mineral waters has been of conſiderable advantage, ſince, beſides the diſco-

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* See the author's book on Mineral Waters.

veries which it has made with reſpect both to the gaſeous and ſolid contents of many of them, it has alſo proved with reſpect to others which contain but little foreign matter, that it is frequently the quantity of water, and not the impregnating ſubſtance, which does good.

I believe the experiment of drinking good pump water at home, of the temperature of Bath, Buxton, or Briſtol water, has ſeldom been tried. I have frequently, with much ſucceſs, recommended the uſe of warm water in dyſpeptic caſes; and in anomalous gout, it ſeems to allay the irritation of the ſtomach, to promote and diffuſe a generous warmth in the extreme parts, and, if taken at night, will generally produce ſleep. Perhaps, beſides its obvious effect of diluting the contents of the ſtomach, it acts alſo upon the principle of tepid bathing; with this difference, that as its operation is exerted upon an organ which has the ſtrongeſt and moſt immediate connexion with the general ſyſtem, the influence of that operation will be more ſpeedily and powerfully communicated to the body at large, than it would be if the ſame were produced upon the ſkin only.

10. WATER heated to a certain degree, when taken into the ſtomach, will produce giddineſs of the head, while the ſame water, of a lower temperature, will

produce no ſuch effect.* This is one reaſon why patients at Bath are directed to drink the water of different ſprings, though not differently impregnated; and it gives riſe to a refinement in practice, which has for its foundation only the different effects of temperature. It is not improbable, but that more benefit will ariſe when the temperature is carried to that degree which produces ſome ſenſible effect upon the head; it is impoſſible to lay down any general rule on this ſubject; it is trial alone on the individual that can determine the point of action.

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* This opinion was firſt ſuggeſted to me by the late Mr. John Hunter, and ſince confirmed by obſervation. Warm water has a ſimilar effect of increaſing vaſcular action, and determining to the head, when applied to the lower extremities.—*Ed. Med. Eſs. v. 6. Art.* 77.

11. I CONSIDER the waters of Heberden, Briſtol, and Buxton, as not having any powers ſuperior to common pump water, heated to the ſame temperature. The ſteadineſs and uniformity, however, of their ſeveral temperatures, entitle them to ſome preference, and render them proper to be drunk by perſons whoſe ſtomachs are irritable, and impatient of their contents, and perhaps weakened in their digeſtive powers by long habits of ingurgitation and gluttony, or from intenſe application to ſtudy, accompanied with a ſedentary life.

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* I find this opinion with reſpect to Briſtol Waters, correſpond exactly with that given by the late Dr. Heberden, in his "*Commentarii de Morborum Hiſtoria et* "*Curatione,*" p. 71.

12. In all caſes where bile is ſecreted in too large a quantity, the uſe of emetics is improper; they increaſe the irritable condition of the hepatic ſyſtem, and divert the bile from the inteſtines. In almoſt all caſes where vomits are given, bile, is forced during their action, from the *duodenum* into the ſtomach, which would otherwiſe have been carried off by the inteſtines; indeed, the actions of nauſea and vomiting increaſe its ſecretion. In general, bile is a purgative ſufficiently ſtimulating for its own evacuation, only requiring the aſſiſtance of warm water for facilitating its diſcharge; if, however, in ſome caſes, it irritates without purging, I would recommend the uſe of ſmall doſes of

the neutral ſalts, ſuch as Soluble Tartar, Sal Catharticus Amarus, and the like; and in all caſes they do moſt good under dilution.

13. This ſuggeſts the propriety of recommending the uſe of Cheltenham water to perſons returning from warm climates. It may be dr$\overset{u}{\text{i}}$nk either with or without its chalybeate part; but at all events its doſe ſhould be ſuch as to produce a purgative effect. Perhaps it would be more advantageous to take it every other morning than to uſe it daily: it may be well and ſucceſsfully imitated by artificial means, ſo as to be drunk at a diſtance from the ſpring with nearly equal effect as at Cheltenham.*

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* See the author's Treatiſe on the Chemical Hiſtory, and Medical Powers of Mineral Waters, p. 277.

14. THE ſtomach, is greatly aſſiſted in its energy and power, by warm clothing, eſpecially on the lower extremities of the body. The diet of a patient, whoſe ſtomach and bowels are extremely irritable by the exceſs and prevalence of bile, ſhould be moderate in quantity, and of eaſy digeſtion. This will neceſſarily exclude melted butter, every thing fried, every ſpecies of paſtry, together with cold and raw or unboiled vegetables. Ripe fruits may be admitted, in moderate quantities, rather before than after dinner. Water, or wine and water, may be drunk for common uſe. Spirituous liquors of all kinds ſhould be avoided, as having a tendency, more

directly, to produce diſeaſes of the liver, and to weaken the tone of the ſtomach.

15. THE CHOLERA MORBUS may very properly be conſidered under the head of thoſe diſeaſes which depend on the increaſed ſecretion of bile. It takes place with different dgrees of violence in different habits: in ſome it is ſo acute as to prove fatal in a few hours, while in others it appears only in the form of a ſlight vomiting and purging. In general the ſymptoms are as follow.

16. THE patient is ſeized with a violent diſcharge of a dark coloured fluid, in large quantity, and ſomewhat of a bitter taſte, both from the ſtomach and inteſtines, with much pain and anxiety about the *præcordia*, together with

cramps or ſpaſms, particularly about the lower extremities: there is a conſiderable degree of thirſt, the pulſe is extremely quick and weak. When the diſeaſe proves fatal, the pulſe intermits and becomes more feeble, the extremities become cold, the patient is ſeized with hiccup, and dies in the ſame manner as perſons do from inflammation of the bowels.

17. THIS diſeaſe is extremely prevalent in this country, in the months of Auguſt and September, ſo as to be conſidered as the autumnal epidemic. It frequently takes place ſpontaneouſly, and independently of any ſenſible occaſional cauſe being applied; at other times it is evidently connected with a

ſudden change of temperature in the atmoſphere during thoſe months, or brought on by drinking cold liquors, or by any thing elſe that ſuddenly chills the body, eſpecially when over-heated by exerciſe or labour.

18. It may likewiſe ariſe from the intemperate uſe of food of difficult digeſtion, and of acid or unripe fruits. In this country, the hepatic ſyſtem is more irritable in the autumn, than at any other ſeaſon: and the diſeaſes which prevail in the months of Auguſt and September, are obviouſly connected with the ſtate of the biliary ſecretion, and approach in their nature to ſuch as prevail in warm climates.

19. The fluid diſcharged in the

Cholera Morbus is evidently bilious, but it is bile in a very diſeaſed ſtate, by no means correſponding with the character of the natural or healthy ſtate of that fluid.

20. IT ſeems probable, that from the quantity ſecreted, and the rapid manner in which it is poured into the duodenum, there is not time ſufficient for a perfect ſecretion; that the fluid therefore, is ſomewhat of an intermediate nature between blood and bile. Perhaps, from a hurried circulation, a conſiderable quantity of red globules eſcape, unchanged, from the capillary veſſels into the *pori biliarii,* and uniting with a portion of bile, are carried by the hepatic ducts into the duodenum.

21. THE varied and increaſed action of a gland has much influence in determining the nature of the fluid ſecreted. In ſome caſes bile is diſcharged, of a green colour, and extremely acrid, not poſſeſſing the qualities of healthy bile.

22. THE cure of *Cholera Morbus* is beſt effected, by firſt diluting the contents of the ſtomach and inteſtines, by the plentiful uſe of warm water, chicken broth, and more eſpecially of mucilaginous liquids, ſo as to ſheath the ſurface of the inteſtines from the acrimony of the bile, and alſo blunt the morbid ſharpneſs of that fluid; and afterwards giving opiates to allay irritation. In the advanced ſtage of the diſeaſe, with a weak pulſe and cold extremities, I

have ſeen great advantage from the uſe of opium with aromatics, as in the *Confectio Opiata*, and of muſk in large doſes. Every thing which has a tendency to vomit or purge actively, ſhould be avoided; but emollient glyſters may be frequently employed. If, in the firſt ſtage of the diſeaſe, ſymptoms of fever and inflammation ſhould occur, the patient may loſe a conſiderable quantity of blood, and a large bliſter ſhould be applied to the abdomen. In ſome caſes the warm bath may be employed with advantage; it is, however, chiefly to diluents and opiates that we truſt for a cure.

23. THE ſecretion of bile is frequently increaſed and hurried by cauſes

acting on the ſtomach, ſuch as ſea-ſickneſs, and emetics; the diſcharge of bile by vomiting, is, therefore, no proof of its having exiſted in the ſtomach before the exhibition of the vomit, or of its having been the primary cauſe of nauſea and indigeſtion: it is only the effect of direct action on that organ.

24. In the bilious fever of the Weſt Indies, the nauſea and vomiting, which ariſe from ſome ſlight degree of inflammation near the pylorus and upper ſurface of the duodenum, invite bile into the ſtomach, which has no tendency to produce the fever; it is only an effect, and not the cauſe of the diſeaſe.

25. In warm climates, contagious

and febrile poiſons have a ſtrong tendency to act on the hepatic ſyſtem, and greatly hurry the ſecretion of bile; indeed, hemorrhages from the liver, accompanying the increaſed ſecretion of bile, frequently take place, and diſſection generally ſhows congeſtion and a turgeſcent ſtate of that organ; this naturally ſuggeſts the uſe of active purgatives in thoſe fevers, ſuch as calomel, jalap, and the neutral ſalts; indeed, ſo ſpecifically has the liver been ſuppoſed to be affected in theſe caſes, that ſome late writers on the ſubject of the contagious yellow fever ſtill raging in the Weſt Indies, have recommended the uſe of mercury, in order to produce a ſalivation; under which, we are aſſured, all the ſymptoms of malignancy have ſubſided.

It was my intention to have conſidered this part of the ſubject very fully; and to have pointed out the circumſtances under which more eſpecially the employment of mercury was ſerviceable; together with the mode in which it probably acts in ſuch caſes. But after an attentive peruſal of all that has been publiſhed by the moſt reſpectable writers on the diſeaſe in queſtion, I find their ſtatements ſo different in many reſpects, and the practice recommended by them ſo oppoſite, as to offer nothing but a field of controverſy, without the means of coming to any clear and ſatisfactory deciſion. It muſt therefore remain doubtful, until ſuch a maſs of evidence be accumulated, as may give a decided preponderance to one or other ſide; and afford a ſolid baſis upon which we can form a rational and conſiſtent theory.

CHAP. II.

OF THE DIMINSHED SECRETION OF BILE.

SECT. I.

From what has been already obſerved on the uſe of bile, and its application to the purpoſes of the animal economy, it is obvious, that any conſiderable diminution in the quantity ſecreted, will be followed by diſeaſe. The liver may be rendered incapable of ſecreting the uſual quantity of bile, by any defect in its ſtructure; and that this is frequently the impeding cauſe, appears from diſſection.

2. It is an organ very ſuſceptible of chronic inflammation, which, without alarming in the firſt inſtance by painful or active ſymptoms, gradually induces obſtruction; firſt, with an increaſe, and frequently afterwards, a diminution of its bulk; perhaps ultimately obliterating the capillary veſſels and pori biliarii, the more immediate ſeat of ſecretion. In ſuch caſes, the patient will be ſubject to occaſional pain in the right hypochondrium, extending to the ſcapulæ, a quick pulſe, an increaſe of heat, alternating with chilly ſenſations, difficult breathing on quick

motion, ſome difficulty of lying on the left ſide, flatulency, indigeſtion, acidity, coſtiveneſs, and, together with a gradual diminution of ſtrength and fleſh, the patient has a pale or ſallow complexion. Such ſymptoms are accompanied with a defect in the ſecretion of bile, and a torpid ſtate of the inteſtines.

3. It is probable, that, under theſe circumſtances, the original miſchief is in the ſtomach and duodenum, and that the ſympathetic action on the liver, is leſs than that on which perhaps healthy ſecretion may depend; hence dyſpeptic complaints generally precede affections of the liver, and ariſe from intemperance either in eating or drinking, but are more particularly induced by the

abuſe of ſpirituous liquors, even though diluted with water. The ſtomach, by long faſting, has its digeſtive powers much weakened, by which the ſecretion of bile is diminiſhed, and a diſeaſed ſtructure of the organ ultimately induced. Grief and anxiety of mind firſt weaken the powers of the ſtomach, and ultimately thoſe of the liver, and thereby diminiſh ſecretion: a ſedentary life will do the ſame.

4. HYPOCHONDRIACAL complaints are always attended with ſymptoms of dyſpepſia and diminiſhed ſecretion, and great torpor of the alimentary canal. In the chloroſis of women we have likewiſe a diminution in the quantity and activity of bile.

The extent and duration of pains ariſing from an incipient or advanced diſeaſed ſtructure of the liver, are ſo various, as frequently to deceive both the phyſician and patient; the pain extends to the ſhoulder, ſcapulæ, muſcles of the neck, along the arm, even to the joints of the wriſt. Every change of poſture either relieves an old pain, or induces a new one; and bending the trunk of the body in any direction, or extending the arms, induces it. I have known patients as much afraid of a change of exiſting poſtures, as if the muſcular parts of the body were under the influence of rheumatiſm. In the early ſtage of hepatic affections, no hardneſs or increaſed bulk is obſervable; but as the diſeaſe advances, the organ as it were deſcends beyond the edge of the ribs, and may be felt in a hard and enlarged ſtate,—with more or leſs fever during the night, encreaſed by the abuſe of animal food and fermented liquors; pains greater in bed, and in a ſupine than erect poſture.

5. WHEN the diminiſhed ſecretion is preceded by affections of the ſtomach, ſuch as loſs of appetite, indigeſtion, and flatulent eructations, the diet of the patient ſhould be attentively regulated; and the art of cookery ſhould be rendered merely ſubſervient to digeſtion, and the preparation of healthy chyle. The quantity of food taken at any one time ſhould be moderate, and water

ſhould be the only liquid drunk with our meals, as more effectually promoting digeſtion than fermented liquors of any kind. All raw or unboiled vegetables ſhould be avoided; ripe fruits may be moderately taken; almoſt all boiled vegetables may be admitted. Animal food ſhould be well boiled, or moderately roaſted, and taken with its own gravy. Pye-cruſt, and every thing fried, ſhould be excluded; butter rendered rancid by being melted, ſhould likewiſe be forbidden. The patient ſhould uſe moderate exerciſe, and drink ſome chalybeate water of a tepid heat, before breakfaſt, and perhaps in the evening.* By thus giving vigour and energy to the ſtomach and duodenum, the healthy action of the liver will be reſtored.

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* As the gaſeous power, however, of chalybeate waters is in general very inconſiderable, and the quantity

6. I AM perſuaded that the ſtomach digeſts ſolid aliment more eaſily than liquid and bulky food; and that ſoups and broths are more quickly diſpoſed to run into active fermentation, and require the exertion of more vitality to reſtrain ſuch morbid and ſpontaneous changes, than animal food in a ſolid form. During the period of our being awake, the ſtomach ſhould have a ſupply of food, at leaſt every ſix hours;

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of iron diſſolved very ſmall, the artificial Spa water, as prepared by Mr. Paul, ſeems preferable even to any natural chalybeate.—For an account of this and various other waters which are prepared by Mr. Paul in a way far ſuperior to any thing of the kind before attempted, *See the Report made by a Committee of the National Inſtitute of France*, &c. on the ſubject.—London, 1802.

the quantity, in that caſe, would be more moderate at any one time, and would be proportioned to the demand of the ſyſtem: the ſupply ſhould be regular. Nor is there any good foundation for diverſifying our meals; ſo that breakfaſt and dinner ſhould be made up of different kinds of food. The ſecretion of bile would be thereby more regular, and the quality better preſerved under ſuch a regimen. A ſtomach, vitiated by bad habits, is with difficulty reformed, but may ultimately be reconciled to ſimple and healthy aliment. There are ſome ſtomachs which reject milk when it has been medicinally recommended; but they are generally thoſe to which milk has been a perfect ſtranger; and in that, as in ſimilar caſes, ſmall repeated quantities of it, taken without the mixture of any other kind of food, have reconciled the ſtomach to any larger quantity which may be thought neceſſary. It frequently diſagrees with thoſe ſtomachs in which morbid acidity prevails; and accordingly I have often found the addition of fifteen or twenty drops of the Aqua Kali puri, conſiderably leſſen, or entirely remove, the inconvenience experienced from taking milk. The condition of the gaſtric fluid and the action of the ſtomach, accommodate themſelves to that regimen, to which the organ has been accuſtomed.

7. THERE are ſome ſtomachs which

are quick and powerful in finiſhing the proceſs of digeſtion, and may require a greater and more frequent ſupply of aliment than others, whoſe powers are more limited; but in no caſe, ſhould the ſtomach ever be perfectly empty. A ſenſe of uneaſineſs and acute pain has proceeded from mere emptineſs, under which, perhaps, the ſtomach may be ſaid to feed upon itſelf: this occurs very frequently in delicate females; who, either from caprice or faſhion, take in very ſmall quantities of food at any one time, and yet whoſe meals are not more frequent than others of a more vigorous conſtitution. In ſuch caſes a meat breakfaſt, and a luncheon at noon, will prove the beſt remedies.

I believe that chloroſis, atrophy, tubercle, and other glandular affections, would be beſt obviated by ſuch a regimen, and females acquire more vigorous and active health by a plan like that now recommended. With reſpect to the quality of our different meals, we ſeem to depart more from the cuſtom of our hardy anceſtors, with regard to breakfaſt, than any other meal. A maid of honor at the court of queen Elizabeth, breakfaſted upon beef, and drank ale after it; while the ſportſman, and even the day-labourer now, frequently breakfaſt upon tea.

A very leading ſymptom of a weak ſtomach, and an enervated conſtitution, is, the loathing of food at breakfaſt;

while a vigorous ſtomach diſcovers more energy in the morning than at any other time of the day. Digeſtion is beſt promoted by a ſtate of reſt after eating; and exerciſe of the body is beſt adapted to reſtoring energy, and promoting the neceſſary ſecretions afterwards.

Dr. Harwood, the Profeſſor of Anatomy at Cambridge, took two pointers equally hungry, and equally well fed; the one he ſuffered to lie quiet after his meal, and the other he kept for above two hours in conſtant exerciſe. On returning home, he had them both killed. In the ſtomach of the dog that was quiet, and aſleep, all the food was digeſted: but in the ſtomach of the other dog, that proceſs was ſcarcely begun.

We may obſerve farther, that the ſtomach, in its office of digeſtion, may derive aſſiſtance from the liver, by the latter counteracting ſome of thoſe effects which ariſe from the diſeaſed action of the former.

We know that when the powers of the ſtomach have been weakened, and when the digeſtive proceſs conſequently proceeds but ſlowly and imperfectly, there is often a conſiderable tendency to *aceſcency* in the different parts of the primæ viæ. Different portions of the aliment taken in, have a tendency to run into the acetous fermentation, when aſſiſted by heat and moiſture.

Thus we find many of the vegetables which we uſe in diet are digeſted with difficulty, and are very apt, in bad ſtomachs, to occaſion ſymptoms of acidity. Flatulence and diſtention frequently ſucceed the taking of theſe ſubſtances into the ſtomach; and the gaſſes ſent out from the mouth, ſerve as an indication of what is going forward within. Cabbages, cauliflowers, peas, beans, and the different farinaceous vegetables, are apt to produce this effect; whilſt thoſe ſubſtances which have no direct tendency to aceſcency, may yet prove an indirect cauſe of it, by weakening the tone of the ſtomach, and thus diſturbing the digeſtive and aſſimilating functions.

But there ſeems to be a power in a

healthy ſtomach, of counteracting thoſe ſpontaneous changes which would take place out of the ſtomach, or in a diſeaſed ſtomach. It is not, perhaps, too much to expect from a vigorous ſtomach, that it ſhould convert into good nutriment, every thing which contains materials capable of forming a healthy chyle. Its powers may probably extend much farther than any trial yet made has diſcovered; and many ſubſtances, which cuſtom has not yet introduced as articles of diet, may be very well managed by this organ. We find that it is capable of aſſimilating ſome ſubſtances which are various and heterogeneous; and, therefore, it is fair to conclude, that it is equally capable of acting upon ſome which are more ſimple.

If, then, the ſtomach poſſeſſes a power, when in a healthy ſtate, of counteracting the ſpontaneous changes which would take place in ſome ſubſtances out of the body, and will even prevent aceſcency in thoſe which are diſpoſed to produce it, if aceſcency does prevail, we muſt conclude, that it is owing to ſome diminution of the powers of the ſtomach. The queſtion then to be anſwered, is, "Can the liver contri-"bute any thing towards the preven-"tion of ſuch an effect as this?"

It has been already proved, in the courſe of thoſe experiments which have been before related, that there is in bile a reſinous ſubſtance, in which reſide the colouring principle and bitter taſte. This bitter, reſembling the vegetable bitter, has probably properties in common with that, and is capable of reſiſting the fermentation going on in the ſtomach, and alimentary canal, when any of its contents are diſpoſed to run into this ſtate. When it comes into contact with theſe ſubſtances, it may act as a chemical agent, and produce ſuch a change upon them, as ſhall prevent that proceſs to which they are diſpoſed.

That this is the effect of the vegetable bitter on other occaſions, conſtant experience evinces, in the uſe of hops, by the addition of which, malt infuſions, that would otherwiſe quickly become ſour, are for a long time prevented from running into the acetous fermentation.

The alkali, which is diſcovered as a conſtituent part of the bile, may ſerve to neutralize the aceſcent matter when it prevails in too high a degree; and thus prevent any miſchievous effects, which might ariſe from its continuance in that ſtate, during its paſſage through other parts of the ſyſtem. We are to remember, that if this change does not take place till after the food has paſſed from the ſtomach into the duodenum, it may ſtill, in a ſecondary way, operate upon the ſtomach, upon that principle of ſympathy which we have before referred to, as ſubſiſting between different parts of the alimentary canal, or between the ſtomach and duodenum, or other ſmall inteſtines.

But not only to this aceſcent ſtate of the contents of the primæ viæ, but alſo to that of *putreſcency*, the bile offers a proper corrective. The foregoing experiments ſerve to prove the greater power which bile has of reſiſting putrefaction than the blood. Without referring, at preſent, to the relative diſpoſition to putreſcency betwixt the two fluids, we may remark, that if the bitter property of bile have this tendency, this is a circumſtance which at once explains the effect referred to. But when we alſo conſider, that to preſerve the general tone and vigour of the ſyſtem, is the beſt mode of obviating putreſcency, we may ſtill more certainly attribute this effect to the bile, which, both by its immediate influence on the inteſtine, and its more remote influence on the general ſyſtem through the medium of the ſtomach, will very powerfully contribute towards that tone and vigour.

6. The temporary defect of bile may be ſupplied by various bitters, occaſionally united with rhubarb, aloes, and the like. The exceſs of acidity may be corrected by alkaline remedies. In infants, the bile is frequently not ſufficiently active, and is generally ſecreted in too ſmall a quantity; hence the diſeaſes affecting their primæ viæ are chiefly thoſe depending upon morbid acidity.

7. In caſes of diſeaſed ſtructure of the liver, producing a diminution of ſecretion, and particularly when ſuch change of ſtructure has ariſen from inflammation, mercury has been found uſeful, even carried to the degree of producing a ſlight ſalivation; moderating the violence, however, of its operation, by plentiful dilution with gum arabic and other vegetable demulcents.

In many caſes where the liver and other abdominal viſcera have been diſeaſed, and in caſes of glandular and meſenteric affection, attended with pain and tenſion, and even ſymptoms of hectic fever, I have ſeen advantages from tepid bathing; the temperature of the water being 90 degrees of Fahrenheit's thermometor. The practice of tepid bathing may accompany the uſe of mercury, and may moderate the dangerous excitement which ſometimes ariſes from it.

8. SEA ſickneſs, and a ſea voyage, contribute very much to reſtore the ſecretion of healthy bile, ſo neceſſary to the welfare of the animal economy; and as they do this with much leſs injury to the ſtomach than any nauſeating or emetic remedies, they may be had recourſe to in caſes where ſuch remedies would be of doubtful or hazardous uſe. The ſymptoms of dyſpepſia and diminiſhed ſecretion, which are now rendered more conſpicuous among females from their ſedentary life, are

moſt effectually removed by the means already ſuggeſted.

9. In ſome caſes, the reſiſtance to the ſecretion of bile may ariſe from the viſcidity of the fluid obſtructing the extremities of the common duct as it enters the duodenum: this will be removed moſt effectually by calomel, ſcammony, or jalap, which ſeem in their operation to ſtimulate and evacuate the duodenum, while many other purgatives act moſt forcibly on the large inteſtines.

10. In the infantile fever of children, ſo well deſcribed by Dr. Butter, a bilious diarrhœa comes on, which proves ſalutary and critical, and ſhould be encouraged by a ſolution of ſal. polychreſt.

in water, and ſometimes by the occaſional uſe of calomel and ſcammony, eſpecially in the early ſtage of the diſeaſe.

11. THERE ſeems much ſympathy between the brain and the liver; and in maniacal perſons, in whom there is generally a defect in the ſecretion of bile; this evil is beſt removed by the means already recommended.

12. THE complaint known under the name of the *ſick head-ach*, is very commonly referred to the preſence of bile in the ſtomach, as its cauſe; and in this opinion I was led to concur, by patients dwelling very much upon the circumſtance of their frequently vomiting bile in the courſe of the fit. From an accurate inveſtigation, however, of

the ſymytoms throughout the progreſs of an attack, I am now ſatisfied that the preſence of bile in the ſtomach is *not* the cauſe; on the contrary, that whenever vomiting takes place, either ſpontaneouſly or by the aid of emetics, the matter thrown up in the firſt inſtance is remarkably acid; and that if, by the violence of the ſtraining, bile is at laſt forced into the duodenum and ſtomach, the termination of the paroxyſm is much more ſpeedy and complete, than when this does not happen. That acidity equally prevails in thoſe caſes where its preſence is not demonſtrated by vomiting, may be inferred, from the great relief which patients labouring under ſick head-ach generally receive from the uſe of antacids, and particularly the Volatile Alkali, which at the ſame time that it ſtimulates the ſtomach, is more powerful than the others in neutralizing acid.

My idea then, with reſpect to this diſorder in general, is,—that in conſequence of a ſpaſmodic conſtriction taking place upon the orifice of the *ductus communis choledochus*, bile is prevented from getting into the duodenum. In conſequence of that inteſtine being thus deprived of its natural and cuſtomary ſtimulus, it falls into an atonic ſtate, in which the ſtomach immediately ſympathizes, and either ſecretes a morbid acid, or by ſecreting a gaſtric liquor deficient in quantity or quality, allows the food which it contains to run into the acid fermentation.

What it is that occaſions this ſpaſmodic conſtriction upon the *ductus communis*, I do not pretend in every caſe to ſay; the facts I have mentioned ſufficiently prove its exiſtence, and are corroborated by the method of cure which is moſt ſucceſsful. The conſtriction may primarily ariſe from ſome conſtitutional diſpoſition to ſpaſm in the duct itſelf, or in the inteſtinal canal at large, as we ſee in hyſteric females. Atony (as Hoffman has long ſince juſtly remarked), is the parent of ſpaſm; and whatever induces ſudden atony in the primæ viæ, and eſpecially in the ſtomach, will ſeldom fail in ſuch perſons, to be ſucceeded by the ſpaſmodic conſtriction in queſtion, which accordingly depreſſes the tone of the ſtomach ſtill farther, and by ſo doing affects the head: hence we can explain why a ſudden piece of bad news, not only takes away appetite, but is often followed by ſick head-ach. If the tone of the ſtomach be diminiſhed in any other way, as by taking in food which it cannot readily digeſt, the ſame effect will often enſue; and this is obſerved to happen more eſpecially when the food is either acid, or of a kind that is much diſpoſed to become ſpontaneouſly ſo. The ſympathy between the ſtomach and other important organs of the body, is well known; and I have obſerved this in a very evident way between the ſtomach and liver. Whenever, either from an irregular diſtribution of nervous energy, to which certain conſtitutions are particularly liable, or from the operation of indigeſtible and aceſcent food, the tone of the ſtomach falls below the degree neceſſary to the chylopoietic proceſs, the liver immediately ſympathizes with it, and bile is no longer emulged into the duodenum. The conſequence of this is, that the general feeling of langour and uneaſineſs which take place from want of action in the ſtomach, is farther aggravated by the acid ſtate of its contents, and moſt ſevere and depreſſing head-ach ſupervenes. In this way, then, from the conſent between the ſtomach and liver, the atonic ſtate which began in the former, is reflected back upon it again with additional force; and an indiſpoſition which would otherwiſe have been inconſiderable and of very ſhort duration, is increaſed to a degree of agony which ſuſpends all exertion both of body and mind, and often continues for two or three days.

13. THE view which I have here given of this diſeaſe, does not at all affect the practice I formerly recommended, which was, the drinking half a pint of warm water at bed time; for it is obvious, that whether the morbid irritation be from bile or from acidity in the ſtomach, dilution will be one mode

of leſſening its effect. Nay it will explain even better than the other, the reaſon why a *warm* diluent is eſpecially uſeful in ſuch caſes, viz. that by its acting as a tepid bath upon the ſtomach and neighbouring parts, it more effectually tends to remove the ſpaſm upon the *ductus communis*, and bring into the duodenum that ſupply of bile which is neceſſary to prevent the effects already mentioned.

14. THE principles here laid down alſo ſerve to account for the benefit experienced from certain remedies, the employment of which was not eaſily reconcileable with their general effects in caſes where there is an increaſed ſecretion of bile; of this kind emetics

more eſpecially are, which have often put an end to the paroxyſm of ſick head-ach, after ſoothing, ſtimulating, and antiſpaſmodic remedies had all been tried in turn without relief (12). As vomiting, however, is in itſelf a morbid action of a very important organ, it ought not to be recurred to frequently, leſt we ſhould weaken the tone of the ſtomach, and finally aggravate rather than leſſen the complaint we wiſh to remove. It ſhould therefore be had recourſe to only in the more ſevere forms of ſick head-ach, which reſiſts the other remedies mentioned; and then it ſhould be excited by ſuch medicines as are leaſt debilitating in their operation; ſuch as the Vitriolated Zinc, taken in the quantity of a ſcruple or half a drachm, in a cup-full of warm water. Where the ſtomach (as ſometimes happens) is very torpid, perhaps the muſtard vomit might be preferable. But whatever be the article, the benefit derived from it will in general be proportioned to its effect in emulging the liver of its bile.

15. WHEN this diſeaſe is conſtitutional, and, as I have ſometimes ſeen it, hereditary, it will frequently be found to reſiſt every means that can be tried for its entire removal, and often to be little affected by any thing taken to ſhorten or alleviate the fit when it has come on. In ſuch caſes the utmoſt attention ſhould be paid to diet, by

avoiding all indigeſtible, acid, or fermentable articles, drinking the artificial mild Seltzer water inſtead of malt liquor, keeping the bowels regularly open by ſmall doſes of rhubarb with natron, and promoting the circulation through the hepatic ſyſtem, as well as mechanically aſſiſting the diſcharge of bile by riding on horſeback: and by a ſteady adherence to this plan, both the frequency and violence of the complaint have been very much diminiſhed.

CHAP. III.

OF OBSTRUCTION TO THE FREE PASSAGE OF BILE INTO THE DUODENUM.

SECT. I.

IF, after bile is ſecreted, its free admiſſion into the duodenum be impeded, ſo that an accumulation of it take place in the excretory ducts of the liver, it either regurgitates into the habit by the hepatic veins, or is abſorbed by the lymphatic ſyſtem; in either caſe it produces the diſeaſe called JAUNDICE; the hiſtory and cure of which I ſhall now endeavour to explain.

2. JAUNDICE may be defined—a yellow colour of the ſkin, and tunica conjunctiva of the eye, with urine of an obſcure red, tinging linen with a yellow hue; and with the fæces generally of a light and clay-like appearance in conſiſtence and colour.

3. THIS is a diſeaſe to which women are more ſubject than men, and adults than children; though it takes place occaſionally in perſons of both ſexes and of all ages. It is attended with a ſenſe of laſſitude and languor, a feeling of pain and tenſion, or weight and oppreſſion about the præcordia; there is frequently much anxiety, and ſome

degree of difficulty in breathing. The eyes and roots of the nails firſt become yellow, afterwards the whole body; which is alſo ſometimes attended by an itching of the ſkin.—The diſeaſe is alſo accompanied with nauſea, vomiting, flatulency, acidity, and indigeſtion; and the fæces, which are commonly of a white colour, have not the uſual fæculent ſmell. Solid food generally taſtes bitter in the mouth in ſome; and in the moſt unfavourable ſtate of the diſeaſe, there occurs hiccup, and occaſional paroxyſms of rigor, or chillineſs. The pain is ſometimes extremely acute in the right hypochondrium, or in the epigaſtrium. The ſtate of the pulſe varies; in general it is quicker than natural, though in ſome caſes, eſpecially during the paſſage of a gall-ſtone, it is ſlower. It very ſeldom or never happens, that objects appear to the patient of a yellow colour.

4. THIS diſeaſe is frequent during pregnancy, and in early infancy; in both, however, it is of a very ſhort duration.

5. ITS decline is marked by a gradual diminution of the ſenſe of weight, oppreſſion, or uneaſineſs about the præcordia; a return of appetite and digeſtion; the urine becomes of a more dilute colour, and is ſecreted in a larger quantity; the ſtools acquire a yellow colour, are more copious, and more

eaſily procured; ſometimes hard and concrete matter is found in the fæces.

6. It is a diſeaſe into which a patient is very liable to relapſe. It is very unfavourable if the pain be violent, and attended with a quick pulſe, loſs both of ſtrength and fleſh, with occaſional chillineſs, watchfulneſs, and melancholy; under thoſe circumſtances, he becomes ſubject either to profuſe ſweating or hæmorrhagy. When theſe ſymptoms attend it, the diſeaſe frequently terminates in a confirmed aſcites.

7. Under ſuch circumſtances we may conclude, that though ſome bile muſt be ſecreted, and that its regurgitation or abſorption is the conſequence of ſome reſiſtance to its free ingreſs into

the duodenum; yet that a part of the liver is, in its ſtructure, or organization, materially diſeaſed; a circumſtance which, though frequently attendant on jaundice, is by no means neceſſary to conſtitute the diſeaſe.

8. On diſſection, various appearances preſent themſelves to our notice. The brain, the bones, and even the cartilages, are found deeply tinged of a yellow colour. The pori biliarii, and ſome of the larger branches of the hepatic ducts, are found ſometimes obliterated by diſeaſed ſtructure. Gall-ſtones are often found in the *ductus communis*, but more frequently in the gall-bladder and cyſtic duct. In ſome a thickening and diſeaſed ſtructure of the *ductus*

communis has taken place, not unlike what has been obſerved in the œſophagus or urethra. In many caſes there have been appearances of mechanical preſſure from the diſtention and tumour of ſurrounding and neighbouring parts, as of the pancreas, duodenum, and colon, either of a temporary or permanent nature; hence a jaundice may ariſe from preſſure during pregnancy. The bile has been found of a very viſcid, and pitchy conſiſtence, eſpecially in the gall-bladder; paſſing from the cyſtic to the common duct, and thereby perhaps reſiſting the paſſage of the more fluid hepatic bile, which would otherwiſe flow freely into the duodenum.

9. THE *chloroſis*, to which young

women are extremely ſubject, puts on, to a ſuperficial obſerver, the appearance of jaundice. In the chloroſis, the tunica conjunctiva is not more diſcoloured than any other part of the body, and the urine is not of a deep colour, but rather pale and limpid.—I am perſuaded, however, that in chlorotic habits the bile is more inſipid, is ſecreted in leſs quantity, and of a paler colour than in health. This imperfect ſtate is, perhaps, in common to all the other ſecretions of chlorotic ſubjects, and may poſſibly ariſe from the watery ſtate of the blood, the paucity of red particles, and the defective energy of the whole ſyſtem.

10. In the endemic fever of the Weſt Indies, in which the ſkin is obviouſly

tinged with bile, there ſeems rather a redundancy of it in the primæ viæ, than a deficiency. Perhaps the quantity of bile which is ſecreted is ſo very conſiderable, that though the greateſt part of it eſcapes into the primæ viæ, the whole may not readily find a paſſage; and the ſurcharge thus occaſioned may give riſe to regurgitation and abſorption. The reaſon for this may probably be, that the diameter of the common duct, or of the larger branches of the *pori biliarii*, though fully adequate to tranſmit the whole of the bile ſecreted in the healthy ſtate of the liver, yet may be inſufficient to convey the exceſs produced under a hurried action of that organ; and therefore, with every appearance of a large ſupply of bile in the primæ viæ, a jaundice may take place. This is uſually the caſe in the ſlight jaundice to which infants are liable; and has been farther proved by direct experiment. M. Portal paſſed a ligature round the inteſtine of dogs, a little below the opening of the ductus communis choledochus, and obſerved, that in five or ſix hours after, the tunica conjunctiva of their eyes acquired a yellow tinge, and upon examining the lacteals, he found them filled with bile. —*Mem. de l'Acad. des Sciences, Anné.* 1777.

11. THE ſymptoms of pyrexia, and other phenomena of febrile miaſmata acting on the body under the endemic yellow fever, together with the delirium, the quick proſtration of ſtrength

after early ſymptoms of local inflammation, either in the duodenum, or region of the biliary ducts, diſtinguiſh it very readily from jaundice.

12. THE ſecretory economy of the liver, in common with that of moſt other organs in the body, is very much influenced by the paſſions. Anger, it is well known, produces ſtrongly marked effects; it not only augments the quantity of bile ſecreted very conſiderably, but likewiſe vitiates it: hence it is, that by being carried into the duodenum in large quantities, and thence regurgitated into the ſtomach, it produces the ſame effects as an emetic.

13. IF the *ductus communis* does not tranſmit it as faſt as it is ſecreted,

and the gall-bladder is ſo full that it cannot receive the exceſs; then it will be forcibly returned upon the hepatic ſyſtem, and by entering the blood-veſſels, produce jaundice.

14. It ſeldom happens, when a ſecretion is hurried by the exceſs of action, that the fluid ſecreted poſſeſſes its natural and healthy properties; hence ariſes the variation in the appearance of bile, which, in ſome acute caſes, as in cholera morbus, I have ſeen of a colour as black as ſoot, ſo as to reſemble more the red particles of the blood, in a broken or diſeaſed ſtate, than the bile. Such a fluid may be conſidered as ſomething between blood and bile; and carried off ſo quickly, that the proceſs

of making bile had only juſt begun, though the change in the condition of the blood with a view to that proceſs, had taken place. This could not have depended on any diſeaſed ſtructure, for it is inſtantly removed by opiates and other means which may reſtrain immoderate action.

15. Men engaged in literary purſuits, and women, from leading ſedentary lives, are very much diſpoſed to jaundice and other diſeaſes of the abdominal viſcera; for the excretory powers of the liver depend but little upon any action which the biliary ducts can perform, as they poſſeſs a very ſmall degree of irritability; but are aſſiſted principally by the agency of the dia-

phragm, and abdominal muſcles, and the periſtaltic motion of the inteſtines; and more eſpecially from the agitation which the hepatic ſyſtem ſuffers during bodily exerciſe. The want therefore of a degree of exerciſe ſufficient to aſſiſt the biliary ducts in their excretory function, muſt neceſſarily lay an ample foundation for morbid affections. And the neceſſity of this external aid to the perfect action the liver, ſeems more obvious from the circumſtances of its venous circulation, which is always more languid than in thoſe ſecretory organs where the fluids are kept in a ſtate of more rapid motion by arterial impulſe. Horſe exerciſe ſeems peculiarly well calculated to aſſiſt the action of the abdominal viſcera, in caſes of defective excitement in the hepatic ſyſtem.

16. The bile, during its ſtay in the gall-bladder, acquires a viſcid conſiſtence; perhaps, in ſome meaſure, from the abſorption of its more aqueous parts, and likewiſe from a propenſity to ſpontaneous ſeparation, by which its coagulable part may detach itſelf. Though this circumſtance is leſs obvious in bile than in blood, and though it may require more time to be effected, yet I think it probable, from analogy, that ſuch a ſeparation of its parts may take place.

17. In many caſes we find the abuſe of ſpirituous liquors diſpoſes to jaundice;

and evidently of the moſt unfavourable kind, becauſe generally accompanied with diſeaſed ſtructure. They may act by firſt altering the ſtructure of the ſtomach and duodenum, and afterwards, by ſympathy of contiguity, affect the biliary ducts of the liver. In the diſſection of thoſe who have been intemperate dram-drinkers, the diſeaſed ſtructure may be traced from the ſtomach along the courſe of the ductus communis, and I have frequently ſeen theſe ducts ſo contracted and thickened, that they could not tranſmit bile.*

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* I was informed by the late Mr. Hunter, that the ſtomachs of dram-drinkers are generally found in a flabby and inelaſtic ſtate, capable of ſecreting only diſeaſed fluids: this loſs of tone in the ſtomach is followed by

18. However remotely ſituated ſome parts of the body may be from others; yet a diſeaſed action is quickly propagated to a diſtance, without affecting intermediate parts; and it frequently happens, that an attempt to cure the diſeaſe of a part, is followed only by its removal to ſome other organ of the body: hence the ſuppreſſion of iſſues, cutaneous eruptions, and hæmorrhoids,

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frequent vomiting, tremulous motions of the muſcles, propenſity to palſy, and loſs of memory.—In many caſes, as has been already obſerved, the liver is ſo far diſeaſed that it does not even ſecrete bile, and a pallid and unhealthy aſpect takes place.

The urine is ſecreted in a ſmall quantity, and of a deep colour, though not tinging linen of a yellow hue. This is frequently a more dangerous ſtate of diſeaſe than jaundice, which indicates only a reſiſtance to the paſſage of bile into the duodenum, and may take place in the moſt healthy ſtate of the liver.

are followed, in ſome caſes, by morbid affections of the lungs, in others, of the hepatic ſyſtem; and theſe do not always ſubſide on reſtoring the diſeaſed action to the organ firſt affected. In confirmation of this opinion, I have ſeen a jaundice with a ſenſe of pain and oppreſſion on the right hypochondrium, correſpond and alternate with piles, and with habitual diſcharges of pus from ulcers in the lower extremities.

19. It is generally admitted, and I think ſufficiently proved by ſome experiments already mentioned, that the biliary ducts are very paſſive, and that they ſubmit very eaſily to mechanical diſtenſion from calculi, without contracting afterwards like ſenſible or irri-

table parts; therefore when jaundice has ariſen from very acrid emetics, or griping purgatives, or cholic, or hyſteria, the reſiſtance to the free paſſage of bile is either at the very extremity of the *ductus communis*, or during its oblique courſe through the ſubſtance of the duodenum, at which part it is liable to compreſſion from the muſcular action of that inteſtine: perhaps, likewiſe, the increaſe of the quantity of bile in the inteſtine, may depend on an action communicated to the ductus communis. In the one caſe, the duct may be cloſed; in the other, it may be acted upon by ſucceſſive motions, by which it emulges more quickly its contents.

20. When we were treating of the natural and chemical hiſtory of the bile, we annexed ſome obſervations on the appearances and component parts of biliary calculi, which will ſuperſede the neceſſity of a repetition of them in this place. It will be proper here, however, to remark, that ſuch concretions do not occur in every part of the biliary ſyſtem with equal frequency; from diſſection it appears, that they very rarely exiſt in the hepatic ducts; ſometimes they are met with in the *ductus communis*, more frequently in the *ductus cyſticus*, and are moſt common in the gall-bladder. The bile accompanying them is more viſcid than uſual, and ap-

pears to contain a larger portion of the colouring and bitter principles.

21. THE number and ſize of theſe calculi vary much: ſometimes the gall-bladder is filled with them, at others there are not more than one or two; ſometimes they are ſmall and angular, at others large, and have a more regular ſurface. I have ſeen a gall-ſtone nearly the ſize and figure of the gall-bladder itſelf, ſo as almoſt to fill the whole cavity. Theſe large concretions are leſs frequently the cauſe of jaundice than ſmaller ones; for, from their bulk, there is but little probability of their entering the ductus cyſticus, and afterwards of obſtructing the ductus communis. It is from calculi of ſmaller

dimenſions that ſuch obſtructions generally ariſe. However, the rule is not without exceptions, and from diſſection it appears, that calculi of conſiderable bulk muſt have paſſed; for the *ductus communis* has been found enlarged to an inch in diameter: an inſtance of which has been met with by Dr. Heberden.

22. But calculi have paſſed, during life, of ſuch a bulk as to occaſion a doubt whether they eſcaped into the inteſtines by the natural canals, or made their way thither by a preternatural paſſage. Dr. Cheſton, ſome years ago, met with a caſe where a gall-ſtone of an unuſual magnitude paſſed during life, and the patient got well. Some years

after ſhe died of another complaint, and on examination it appeared that this large gall-ſtone had made a preternatural paſſage through the gall-bladder into the inteſtine. Mr. Cline, in his excellent collection of anatomical preparations at St. Thomas's Hoſpital, has an inſtance of a caſe of this kind.

23. A PERMANENT jaundice has frequently ariſen from ſurrounding tumours compreſſing the hepatic ducts: a ſcirrous enlargement of the pancreas, has ſometimes produced this effect. Exceſſive vomiting, and violent exerciſe, perhaps by forcing ſtones from the gall-bladder into the cyſtic duct, and from thence into the common duct, have produced the diſeaſe. There is an

inſtance where jaundice aroſe from the ſeeds of gooſeberries being found in the extremity of the *ductus communis* as it enters the duodenum. In ſhort, whatever can obſtruct or impede the paſſage of the bile into the duodenum, muſt be conſidered as a cauſe ſufficient to produce jaundice: but in what way the bile paſſes from the biliary veſſels into the general circulation, has already been explained in the phyſiological part of this work.

24. The jaundice, when ariſing from a diſeaſed ſtate of the ſtructure of the liver, or from the tumour of ſurrounding parts, and more eſpecially if accompanied with fever and gradual diminution of ſtrength and fleſh, is ſeldom

cured, and generally terminates in aſcites.

25. If, on the other hand, it has ariſen ſuddenly in young and vigorous habits (though accompanied even with much pain), unattended with fever and the other unfavourable circumſtances above remarked, it is ſeldom of long duration, and by a judicious treatment may be effectually removed.

26. The *cure* of *jaundice* conſiſts in the removal of exciting cauſes, and in alleviating urgent ſymptoms. Calculi are the moſt frequent exciting cauſes.

27. It appears from experiments, that ſome calculi are ſoluble in an alkali, in ſpirit of wine, and oil of turpentine; but it is altogether impracticable to

make a direct application of thoſe ſubſtances to calculi in the biliary ducts; as we have no facts to prove, that by the courſe of circulation, they can be carried into the gall-bladder ſo little changed as to preſerve any ſenſible degree of power.*

28. It remains yet to be proved, that the proportion of alkali in the bile is increaſed by alkaline remedies. Many ſaline remedies paſs into the urine un-

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* With reſpect to alcohol, æther, and oil of turpentine, and more eſpecially the two firſt, there is certainly no proof that they can arrive at the gall-bladder through the medium of the blood. Yet their efficacy is ſtrongly atteſted by ſome of the moſt reſpectable phyſicians and chemiſts in France.—See two papers on this ſubject by MM. Durande, and Maret, in *Les Nouveaux Memoirs de l'Acad. de Dijon.* tom. 1 & 2.—Alſo, *L'Hiſt. de la Societe Roy. de Medicine*, tom. 3.—And a further account by M. Durande, in a volume of Obſervations publiſhed by him at Strasburgh, in 1790.

changed, and may act on calculi in the bladder; but it is more difficult to detect the preſence of alkaline or other ſolvents in the bile. If we cannot, however, aſcertain that the bile contains more alkali after the uſe of carbonate of ſoda, than it did before, it is becauſe we cannot obtain the bile as it iſſues from the liver, to make the neceſſary experiments for that purpoſe. But, that alkaline ſalts, and eſpecially the foſſil alkali, may and do find their way thither, appears as demonſtrable, as any thing founded on reaſon and analogy can be. It has been ſhewn, that foſſil alkali forms a conſtituent part of bile; the blood then, from which the bile is ſecreted, muſt contain either the elements of this ſalt, or the ſalt itſelf in its formal ſtate. We know with equal certainty, that foſſil alkali taken into the ſtomach, enters the circulating maſs. Can we then ſuppoſe, that the whole which thus enters the blood paſſes off by the kidneys; and that none of it finds its way to a ſecretion of which it naturally conſtitutes an eſſential part? But the argument does not reſt upon analogy only; it is reduced to a queſtion of fact. Among the various remedies employed againſt biliary concretions, there are none which have been nearly ſo ſucceſsful as alkalies taken for ſome continuance; and we muſt either admit, that, by impregnating the blood, they ſupply an additional quantity of that principle upon a defect of which the formation of biliary calculi depends, and thereby render the bile not only leſs diſpoſed to concrete, but even capable of ſoftening and diſſolving concretions already formed; or, we muſt attribute their beneficial effects to ſome occult quality that is equally repugnant to the knowledge which we poſſeſs on the ſubject, and to the genuine ſpirit of ſound philoſophy.

29. THE paſſage of gall-ſtones may be promoted by gentle vomits, and for this purpoſe ipecacuanha is frequently given; but its action will be aſſiſted, if it be exhibited in ſmall doſes, and divided ſo as to occaſion, for a time, a degree of nauſea, but, ultimately, to produce the full effect

of an emetic. Tartariſed antimony, as producing a much greater degree of muſcular relaxation than ipecacuanha, and, on ordinary occaſions, a more complete evacuation of the liver and gall-bladder, may be preferable. For the ſame reaſon tobacco deſerves a trial; as the ſickneſs which it occaſions reſembles ſea-ſickneſs more than any other: and it is probably on this principle, that ſea-ſickneſs has been ſo very efficacious in thoſe caſes.

30. THE duodenum may be ſtimulated by calomel combined with ſcammony or rhubarb; and in caſes of a defect of bile in the inteſtinal canal, the deficiency may be ſupplied by a purgative bitter, ſuch as an infuſion of camo-

mile flowers with tinct. aloes,—or colomba with rhubarb and ſoap,—or vitriolated kali with infuſion of rhubarb. In caſes of violent pain, with a ſlow pulſe, opiates and tepid bathing may be recommended: and where there is pyrexia, with local pain and dyſpnoea, blood-letting and the antiphlogiſtic regimen are proper.

31. GENTLE exerciſe on horſeback is particularly uſeful in promoting the paſſage of calculi, and preventing the ſtagnation of bile in the gall-bladder; which unqueſtionably renders it viſcid, and thereby liable to ſtop up the paſſage into the duodenum.

32. IN jaundice from tumour or other preſſure of ſurrounding parts, ſmall

doſes of calomel, or ſome other mercurial preparation may be uſeful, unleſs ſymptomatic fever ſhould take place, in which caſe mercury does harm. Chalybeate waters may be uſed to advantage, with a view of giving that tone and energy to the ſyſtem, ſo very defective in caſes of jaundice.*

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* Mr ~~Dr~~. Dick, a gentleman high in the medical profeſſion in Bengal, and of much practice in Calcutta, in a letter to me, ſays,——"I have been for the laſt ſeven "years in the habit of giving calomel in the jaundice, "in doſes from two to five grains every night, till the "mouth was affected, and in every caſe, the jaundice "went off as ſoon as the mouth became ſore.—I now "ſcarcely uſe any other medicine, except merely to "prevent coſtiveneſs.—I cured upwards of forty patients "in that way, and all in leſs than a month, generally "in ten days or a fortnight." The ſame gentleman, in a ſubſequent letter to a friend, after paying many compliments to my Treatiſe on the Liver, ſays——"I "think, however, that Dr. S. has not ſo high an opinion "of the good effects of mercury in liver complaints, as "it deſerves.—I have been confirmed more and more by

" late practice, in my opinion, of its effects in the jaun-
" dice, though I do not attempt to reaſon upon it.

" In recent attacks of liver complaints, after early
" bleeding, bliſtering, and the free uſe of laxatives, I
" never ſaw a caſe where ſuppuration came on if mer-
" cury were freely uſed, and continued 'till the mouth
" was ſore; and, if I be not much miſtaken, it is in
" ſuch caſes that it has the beſt effects.—In chronic
" caſes, where there is no fever, but only an obtuſe pain
" in the ſide and ſhoulder, with a fullneſs in the ſide,
" and about the pit of the ſtomach, keeping up a con-
" ſtant uneaſineſs, mercury ſeems to me to have but little
" good effects: when uſed freely it removes the ſymp-
" toms at the time, but they generally return as ſoon as
" the mercury is left off. Having been repeatedly baffled
" in this way, and obſerving very often that ſuch liver
" attacks ſucceeded long courſes of mercury, undergone
" for the cure of venereal complaints, I have, for ſeveral
" years paſt, truſted to a ſeton or iſſue made in the ſide,
" and with ſucceſs far beyond my expectations."

Theſe being the remarks of a gentleman of much practice and obſervation, I have given them in his own words, being convinced that they deſerve the particular attention of thoſe who practice in India.

CHAP. IV.

OF THE DISEASES TO WHICH THE LIVER IS SUBJECT IN COMMON WITH OTHER ORGANS OF A GLANDULAR STRUCTURE.

SECT. I.

THE liver is ſuſceptible both of acute and chronic inflammation; perhaps of the former, as being more immediately connected with its arterial or nutrient, the latter with its venous or ſecretory, ſyſtem. When the liver is ſeized with acute inflammation, the diſeaſe is called Hepatitis.

2. It is generally preceded by ſome degree of *horripilatio* and *rigor*, which in ſome caſes, however, are ſo ſlight as to evade the attention or recollection of the patient; to theſe ſucceed an increaſe of heat, and quickneſs of pulſe. The pain in the right *hypochondrium*, or region of the liver, is very acute, attended with difficult and painful reſpiration, great watchfulneſs, and occaſional delirium. The patient lies with more eaſe on the right ſide. The urine is ſecreted in ſmall quantity, is high coloured, and frequently tinged with bile. The tongue is generally covered with a white cruſt, and, together with the mouth and *fauces*,

is extremely dry. Theſe are the leading ſymptoms of Hepatitis.

3. The ſymptoms are ſomewhat varied, according to the particular part of the liver which may happen to be the ſeat of the diſeaſe. If the inflammation attack the convex ſurface of the liver, ſo that the peritoneum becomes affected, the pain is much increaſed by external preſſure, and ſome degree of tumour may be obſerved. If that part of the organ be diſeaſed which is more immediately contiguous to the diaphragm, it gives riſe to difficult and painful reſpiration, dry and frequent cough, acute ſhooting pains in the thorax, extending to the humerus, clavicle, and ſcapula; chiefly of the affected ſide.

4. THESE ſymptoms, from the reſemblance they bear to thoſe of pleuriſy, peripneumony, and other inflammatory affections of the cheſt, are apt to miſlead an unwary practitioner; but are to be diſtinguiſhed from them by an attention to the hiſtory and progreſs of the complaint.

5. IN ſome caſes of Hepatitis, the ſtomach is ſo extremely irritable, that violent retching or vomiting occur; ſymptoms occaſioned, perhaps, by the inflammation being in the vicinity of that organ. In moſt caſes the ſecretion of bile is increaſed under active inflammation, though its paſſage into the *duodenum* is frequently impeded; ſo that

jaundice is no uncommon ſymptom of this diſeaſe.

6. If the ſymptoms of *fever* and local pain continue to increaſe rapidly for a few days, a ſuppuration takes place; a large quantity of pus is formed, the external tumor becomes more prominent, and a fluctuation may be perceived, ſo as ſucceſsfully to direct the ſurgeon to the ſafeſt place for an artificial opening by the lancet, or by cauſtic. During the formation of pus, frequent rigors take place, and a ſenſe of weight and oppreſſion ſucceeds that of acute pain.

7. It frequently happens, that *pus* is formed either in the vicinity of the *ducts*, or the concave part of the liver;

ſo that no external tumor can be perceived. The uſual ſymptoms of ſuppuration, however, may be obſerved in all caſes where matter is produced; and if the outlet to it be free and open by the inteſtines, the patient frequently recovers, even after being much emaciated, and under appearances extremely unpromiſing. If again, on the other hand, the pus is diſcharged either through the *diaphragm* into the cavity of the thorax, or more directly into that of the abdomen, the diſeaſe generally proves fatal.

8. WITH reſpect to the manner in which the diſcharge is effected in thoſe caſes where it paſſes off by the inteſtines, it muſt be clear, that ſome of the

branches of the hepatic duct are involved in the ſuppuration, and conſequently deſtroyed by the ulcerative proceſs.

9. We ſhould then naturally expect, that the pus would inſinuate itſelf into thoſe orifices of the hepatic ducts, which ulceration had formed, and by thoſe channels make its way into the duodenum.—But this explanation is not unattended with difficulty: for it muſt be recollected, that wherever ſuppuration and ulceration are going forward, there adheſion is an attendant.

10. It would be departing from the main object of this work, to enter into an inquiry on the advantages reſulting to the machine from this connexion of

inflammatory ſtages; as thoſe advantages are as much diverſified as the parts which are the ſeat of inflammation. It is in place here, however, to obſerve, that an abſceſs of the liver, in common with that of other parts, has its boundaries circumſcribed by the effuſion of coagulable lymph, ſo changed by paſſing through inflamed veſſels, that the parietes of that abſceſs become ſoldered into a ſolid compact maſs. Thus an abſceſs which, under contrary circumſtances, would have diffuſed itſelf to an indefinite extent, now becomes determined and circumſcribed.

11. THESE conſiderations prepare us for a change, which muſt neceſſarily be induced on the ulcerated branches of

the hepatic duct; the coagulable lymph, which is every where poured out upon the internal ſurface of the abſceſs, will, in all probability, ſo obſtruct the ulcerated orifices of the biliary ducts, that no pus can make its way through them into the inteſtines.

12. NOTWITHSTANDING this, I think it very probable, that an abſceſs may point on the concave ſurface of the liver, and ſo far involve the hepatic duct, that it may ulcerate through its coats, and allow the matter to paſs into the duodenum. Whether we may be able to diſtinguiſh ſuch a caſe in the living ſubject, is rather doubtful; but I ſhould ſuſpect that the diſcharge of pus by the inteſtines will then be very gradual, as

the opening of communication is rather ſmall.

13. Perhaps the moſt uſeful evacuation of hepatic abſceſſes by the inteſtinal canal, is that where an adheſion taking place between the ſuppurating part and the inteſtines, an ulceration enſues, and the contents of the abſceſs have a ready paſſage into the inteſtines. This may happen in different parts of the inteſtinal canal, according to the ſituation of the abſceſs.—When it is ſeated at the concave part, the duodenum may be favourable for that purpoſe; but when the lower edge of the liver is the part concerned, the great arch of the colon is the uſual outlet; and in theſe caſes it is highly probable,

from the ſcale of the parts concerned, that the opening of communication will be more extenſive, and the diſcharge of the matter more free.*

15. THE diſeaſes which are miſtaken for hepatitis, are, peripneumony, inflammation of the ſtomach, and rheumatic affections of the muſcles in the neighbouring parts.

13. THE hepatitis is leſs eaſily diſtinguiſhed from the peripneumony, when that part of the liver is affected, which is ſeated within the falſe ribs, and where

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* This view of the complaint accords generally with that of my friend Dr. Cheſton, who favoured the world with his thoughts on this ſubject many years ago, in his publication called *Pathological Inquiries and Obſervations;* a work not leſs diſtinguiſhed for accuracy of obſervation, than valuable for the judicious remarks it contains.

it enlarges itſelf in ſuch a direction, as to make a preſſure on the diaphragm ſufficient to diminiſh the cavity of the cheſt: and it is probable, likewiſe, that from the extenſion of the inflammation into the ſubſtance of that organ, its operation as an inſtrument of reſpiration may be much impeded.—Under theſe circumſtances a troubleſome cough, with difficulty of breathing, comes on; ſo that the diſeaſe aſſumes the appearance of thoracic inflammation.

16. It is more eaſily diſtinguiſhed from the inflamed condition of the ſtomach, by its not being accompanied with that extreme ſenſe of heat and pain with which the organ is affected, eſpecially after taking any thing into it;

nor is the debility of the ſyſtem ſo great in the inflammation of the liver as in that of the ſtomach.

17. In the caſe of muſcular pain, there is little or no fever; the pain is more diffuſed, is frequently removing from place to place, and is more influenced by varying the poſture of the body: it generally alternates with rheumatic pain in one or more joints of the body.

18. When the hepatitis terminates ſpontaneouſly and favourably, there is ſome evacuation by hæmorrhagy, diarhœa, perſpiration, or a copious ſediment in the urine. In ſome caſes I have ſeen a great increaſe of bronchial ſecretion accompanying the reſolution of

this diſeaſe; and it is not improbable, but that a ſuperficial diſcharge of coagulable lymph may promote this reſolution, though afterwards productive of adheſive inflammation.

19. It has frequently happened, that a large abſceſs has very quickly formed, which, either by corroding the large blood-veſſels, or by effuſing pus into the general cavity of the abdomen, has proved fatal.

20. Symptoms indicating the formation of matter in the ſubſtance of the liver, have ſometimes ſuddenly ceaſed; ſo that either a tranſlation of the diſeaſe to ſome other organ has taken place, or the pus has been quickly abſorbed, and been diſcharged by urine.

21. The period of ſuppuration varies according to the degree of inflammation, temperament of the patient, nature of the climate, ſeaſon of the year, or the means of cure which have been adopted.

22. The ſymptoms of ſuppuration are not always, however, very obvious; the moſt ſtriking of them are, a diminution of pain, a ſenſe of pulſation and of weight in the right hypochondrium, eſpecially when lying on the left ſide; frequent rigors, an acceſſion of fever towards evening, with fluſhings of the countenance, a propenſity to profuſe ſweating, and other ſymptoms of hectic fever. In many caſes the fluctuation is very apparent. I have ſeen ſome inſtances where the pain and inflamma-

tion have ſubſided very ſuddenly, and have been ſucceeded by a low, fluttering pulſe, cold extremities, deliquium, and death: ſo that there has been reaſon to ſuſpect, that this organ may, on ſome occaſions, though much leſs frequently than others, become gangrenous.

23. The hepatitis frequently terminates in the enlarged and ſcirrhous ſtate of the organ; and we may obſerve, on the inſpection of dead bodies, ſuch a variety in the appearances, as to ſuggeſt the idea of different kinds of ſcirrhous affection, which will be beſt explained by attending to the progreſs of chronic inflammation in the liver; to which ſpecies it is more ſubject than to the

acute. It is indeed ſufficiently evident from diſſection, that the liver is ſubject to inflammation which did not obviouſly appear from any prevailing ſymptom before death: though, perhaps, a more accurate attention to circumſtances might have aſcertained the diſeaſe.*

24. From repeated obſervation I am induced to believe, that the chronic inflammation of the liver is frequently miſtaken for a dyſpeptic ſtate of the ſtomach. And I have ſeen many caſes of this kind, which have been ſuppoſed to ariſe from indigeſtion. The patient generally complains of pain, which he

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* For a more particular account of the diſeaſed ſtructure of the liver, the reader may conſult the Morbid Anatomy of the Human Body, by Dr. Baillie; a moſt excellent and uſeful book.

falſely attributes to the ſtomach; and its continuance is ſo ſhort, and the degree of it frequently ſo inconſiderable, that no alarm reſpecting the future health of the patient is produced. The relief obtained by eructation and diſcharge of air, tends to confirm the opinion that the ſeat of the diſeaſe is in the ſtomach; but this relief may be explained on the principle of removing the diſtention of the ſtomach, and ſo taking off the preſſure of this organ from that which we think is the ſeat of the complaint. I believe from experience, that an attention to the following circumſtances will enable us with ſome certainty to diſtinguiſh the diſeaſe.

25. In thoſe caſes where the liver is

affected, conſiderable pain is felt in the parts near the ſcrobiculus cordis and epigaſtric region, upon any degree of preſſure; and as the diſeaſe advances, an increaſe of heat, a quickneſs of pulſe, and other ſymptoms of fever, are obſerved, eſpecially towards night. The patient will ſometimes derive relief from bleeding at the arm; and the blood, when drawn, will put on thoſe appearances which are common to febrile complaints, and diſorders of an inflammatory nature.

26. The acute inflammation of the liver is an endemic diſeaſe in warm climates, more particularly in the Eaſt Indies, and very generally terminates in ſuppuration. When the ſymptoms

of active inflammation, however, have been checked, though not effectually removed, by the antiphlogiſtic practice, the diſeaſe frequently becomes chronic, and terminates in a ſcirrhous induration of the organ.

27. On this ſubject much information may be obtained by obſerving the countenance of the patient, which, though not wearing the appearance of jaundice, yet has a peculiar ſallowneſs, expreſſive of a morbid condition of the liver.

28. The two complaints are not more diſtinguiſhed by their ſymptoms, than they are by the different ſtates of the liver which produce them.

29. In chronic inflammations, a condition obtains in ſome degree the reverſe

of the former. Inſtead of appearances which accompany and characteriſe acute and active inflammation, there are manifeſt ſigns of indolence and want of action in the circulating ſyſtem. The colour natural to this organ in the healthy ſtate, and which appears to be imparted to it by the bile, is loſt; it aſſumes an aſh or clay-coloured hue, evidently connected with a diminiſhed ſecretion.

30. This kind of liver is obviouſly ſmaller, it undergoes a change of ſhape; the lower edge, which is naturally thin, eſpecially that of the left lobe, becomes rounded and gibbous.

31. If we cut into this ſubſtance, we find uniformly a ſolid compact ap-

pearance, interſperſed with foramina, evidently the oriſices of divided veſſels; but if we compare the cut ſurface of a diſeaſed liver with that of a healthy one, we obſerve a very ſenſible difference, the latter being much more porous than the former. This morbid and compact ſtate, together with the diminiſhed bulk of this organ, lead us at firſt view, to a ſuſpicion that the diminiſhed ſize may be explained on the principle of conſolidation of its ſubſtance; or, in other words, that it has gained in compactneſs what it has loſt in external bulk.

32. If this explanation were juſt and adequate, we ſhould find the liver of its natural weight; but obſervation has evinced that, together with a diminu-

tion of bulk, there is ſome degree of loſs in its weight; evidently proving, that a portion of its ſolid ſubſtance has been removed, and carried into the general maſs of fluids, agreeably to a law of the abſorbent ſyſtem.

33. But I ſtrongly ſuſpect, that this diminution of ſubſtance obtains in different degrees, according to the period or duration of the complaint. In the more early ſtages of ſcirrhoſity, the liver is not ſenſibly diminiſhed in its bulk: nay, I am perſuaded, that there is, at this period, an increaſe both of bulk and weight, but that afterwards, there is a gradual diminution of both; and this is nothing more than may be expected,

when we conſider the cauſes that occaſion this diſeaſe.

34. These cauſes are of a nature which tend to produce a hurried ſecretion, and conſequently an imperfect ſtate of the bile, viz. long reſidence in a warm climate, and the immoderate uſe of ardent ſpirits.

35. But, whatever be the remote or occaſional cauſes, it muſt be evident that the immediate cauſes can admit but of little variety. To produce an increaſed ſecretion of bile, it is plain that there muſt be an increaſed action of the branches of the vena portarum, and an acceleration of fluids through thoſe branches: hence a condition of veſſels is induced, approaching in ſome re-

ſpects to that of inflammation, with this difference, that it is an inflammation in which the vein, or ſecreting veſſel, is more concerned than the artery or nutrient veſſel.

36. THE effect of this action, eſpecially when protracted for a conſiderable time, muſt neceſſarily be that of inducing an alteration in the ſtructure of the part; an alteration ſimilar to what obtains in other organs labouring under indolent and chronic inflammation.

37. THIS change of ſtructure, from its ſolidity and compactneſs, ſeems to depend on the effuſion of the coagulable lymph into the parenchymatous ſubſtance of the liver; with this peculiarity,

that while it is, in active inflammations, depoſited by arteries, it is, in the chronic kind, effuſed by the veins.

38. Thus we are in poſſeſſion of a cauſe which appears to explain that diminiſhed ſecretion of bile uſually met with in ſuch caſes; in which a hurried or exceſſive ſecretion was wont to prevail: but to proceed any further in this train of reaſoning, would be to anticipate what we have to propoſe on the ſubject of the proximate cauſe.

39. If this poſition juſt ſtated be true, it muſt be admitted as a conſequence, that ſuch livers are not performing their full ſhare of that office, to which they were deſtined by nature.

40. Now we know, by a law of the

abſorbent ſyſtem, that ſuch parts as ceaſe to perform the office which nature intended they ſhould do, are conſidered as uſeleſs bodies, and are fit ſubjects for the action of theſe veſſels: hence it is, that there is a greater diminution of ſubſtance in thoſe ſcirrhoſities which are of long ſtanding, than in ſuch as are of more recent date.

41. To inquire in what conſiſts the proximate cauſe of inflammation of the liver, is to inveſtigate what is the proximate cauſe of inflammation in general. The limits preſcribed to this work do not allow us to enter extenſively into this queſtion, as it would involve an examination of the prevailing theories on this ſubject.

42. From obſervation we are taught the means that are uſed with advantage to palliate, and even to remove inflammation; and from obſervation likewiſe we learn, that the ſame means which are ſerviceable in one inflammation, are injurious in another: now, admitting the axiom, "that ſimilar cauſes produce "ſimilar effects under ſimilar circum- "ſtances," and finding likewiſe, that ſome inflammations are aggravated by the very means which cure others, we infer as a conſequence, that the condition of inflamed veſſels, or, in other words, the proximate cauſe of thoſe ſymptoms denominated inflammation, is not always the ſame. Hence ariſes a conſiderable ſhare of the difficulty at-

tending the inveſtigation of proximate cauſes in general.

43. The phenomena of inflammation evidently ſhew, that in every inflamed part there is a congeſtion of blood, in a greater or leſs degree. This is very conſpicuous in thoſe parts of the body where, from their ſituation, we are enabled to ſee the change of colour, as in the ſkin; but more eſpecially the tunica conjunctiva of the eye, where, from its tranſparency, and the white ſubjacent tunica albuginea, we have an opportunity of ſeeing clearly the commencement and progreſs of inflammation.

44. The firſt appearance is a diſtention of ſome of its veſſels, in ſuch a degree as to allow red blood to paſs

where ſerum only was wont to circulate. In the progreſs of inflammation, more veſſels become diſtended, until at length the whole eye aſſumes almoſt one uniform red appearance.

45. Now, on what peculiar ſtate of veſſels does this diſtention depend? Are the powers that act in propelling the blood from the larger veſſels to the ſmaller ones increaſed, while the reſiſting powers of the ultimate branches remain the ſame as in health, "but, from being "originally weaker than thoſe of other "parts, give way to the increaſed impe- "tus?" Or have the ultimate branches undergone a change of ſuch a nature, as to yield to the ordinary force, or natural *vis a tergo* of the larger veſſels?

46. There are good reaſons for believing, that each of theſe conditions exiſts in its turn: at leaſt the methods employed with ſucceſs to remove inflammations of this part, lead to that opinion. For it is a fact well eſtabliſhed in the treatment of theſe complaints, that the ſame means which are employed in the cure of one opthalmia, tend to aggravate another. The means generally employed in theſe caſes, are ſuch as either diminiſh action or increaſe tone; and each plan of treatment is ſucceſsful in its proper caſe.

47. Now what has been ſaid of opthalmia will apply to hepatitis and other inflammations.

The liver may be inflamed in conſequence of external injury. In ſuch caſes it is probable that a violent and ſtrong action will take place, analogous to what would happen in the eye from the preſence of an extraneous body; and that a plan of treatment evidently ſedative or antiphlogiſtic, is moſt likely to be efficacious in both.

48. On the other hand, the ſame organs may be in a ſtate of inflammation without the application of any obvious ſtimulating cauſe. In the eye, experience has evinced that this kind of opthalmia is moſt ſucceſsfully treated by bark, and ſuch external applications as tend to ſtimulate and give tone; evidently ſhowing that the eſſential character of that inflammation is de-

bility. And further, it is now well underſtood, that an inflammation of the eye which was of the active kind at its commencement, changes in its progreſs to a ſtate of debility, and yields only to thoſe means that give tone and ſtrength to the part.

49. It is of importance to our ſubject to inveſtigate in what way an active inflammation degenerates into an indolent one.

We have ſaid, that in every inflammation, there is ſome degree of congeſtion of blood, and conſequently diſtention of veſſels: if this congeſtion be relieved at its commencement, by leſſening the diſtending cauſe, the veſſels, ſtill preſerving their tone, readily return to their original dimenſions: but if, on the other hand, the congeſtion is allowed to remain, and of courſe the diſtention of the veſſels, their tonic power neceſſarily becomes diminiſhed, and ſuch means only can avail, as tend to leſſen the column of the blood, and increaſe the contractile power of its veſſels.

Theſe reaſonings may ſerve to give ſome idea of the two ſtates of the veſſels as connected with active and indolent inflammation.

50. As the principles laid down apply to inflammations of any organ, we ſhall endeavour to ſhow, by conſidering the nature of remote cauſes, in what way they may produce this ſtate of veſſels in hepatitis.

51. Many remote cauſes of hepatitis may be enumerated, ſuch as affections of the mind, particularly anger, long protracted ſummer heat, the intemperate uſe of ſpirituous liquors, &c. But to produce the ſame diſeaſe, it is natural to expect that there is one principle of action in common to them all. This principle appears to conſiſt in inducing a ſtate of excitement in the circulation of the liver: and the accelerated, though imperfect, ſecretion of bile, together with the ſenſe of fulneſs in the region of the liver antecedent to inflammation, tend to ſhew that hepatitis is generally preceded by congeſtion.

52. If proper methods be taken to relieve this congeſtion on its firſt at-

tack, ſuch as diminiſhing the column of blood, or inducing a determination of it to contiguous parts, the tone of the veſſels will be preſerved, and actual inflammation prevented. Or even if an obvious inflammation has commenced, the ſame means will be equally ſerviceable by allowing the diſtended veſſels to recover that tone which they were beginning to loſe. But if the congeſtion has been of ſome duration, and the tonic ſtate of the veſſels conſiderably impaired, if the moſt active means are not employed, the conſequence will be either a ſuppuration, if the inflammation be violent, or a degeneracy into ſcirrhus, if the inflammation has been moderate: and it is in this way, I conceive, that an inflammation of the liver, which was of the active kind at its commencement, changes in its progreſs into a ſtate of ſcirroſity.

53. OR, a ſcirrous ſtate may be gradually induced on the liver, without any pre-exiſting active inflammation; as happens after a long reſidence in a warm climate, where, from frequent accelerated ſecretion of bile, the hepatic veſſels, but more eſpecially the branches of the vena portarum, become ſo relaxed, that they effuſe into the parenchymatous ſubſtance of the liver that ſolid matter, which appears to be nothing more than the coagulable lymph of the blood changed in a peculiar way.*

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* DROPSY is a very general conſequence of a diſeaſed liver, which, from previous inflammation, may

Admitting this poſition, it muſt follow as a conſequence, that when the action of the whole exhalant ſyſtem of the body is increaſed, the effuſion, which is the effect of it, muſt be as extenſive as the cauſe: and on the contrary, when the accelerated action is confined to a part, the effuſion muſt likewiſe be

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have ſuffered in its ſtructure in ſuch a way as to produce a conſiderable impediment to the tranſmiſſion of blood by the vena portarum.

Such dropſies ſometimes firſt manifeſt themſelves by water in the abdomen, at others by a fluid in the cellular membrane. Now, as both of theſe originate from the ſame cauſe, it may deſerve inquiry, to what circumſtances we ſhould impute this apparent want of uniformity in nature.

This explanation muſt be ſought for in the laws of the circulation. Whatever ſhare a diminiſhed action of the abſorbent ſyſtem may have in producing an accumulation of watery fluids, it muſt be evident, that a conſiderable degree of effuſion from the exhalant ſyſtem is eſſentially neceſſary, and which exceſs of effuſion can ariſe only from an exceſs of vaſcular action.

equally limited. Now are there any cauſes to which we can refer this extenſive or limited action? As all accelerated action is to be referred to ſtimuli of ſome deſcription, we naturally inquire how that condition of veſſels can be produced ſometimes in the whole exhalant ſyſtem, ſometimes in a part only.

From eſtabliſhed laws in the vaſcular ſyſtem, it is clear, that whatever can impede the free paſſage of the blood from the venous ſyſtem to the right ſide of the heart, or from the right ſide of the heart to the left, will operate as a ſtimulating cauſe, and produce effects on the exhalant ſyſtem, either limited or extenſive.

To ſatisfy ourſelves reſpecting this point, we need only compreſs a principal vein either of the upper or lower extremity, at the ſame time allowing the artery to remain free. The effect of this experiment will be, that the veins below the preſſed part, immediately become diſtended, the limb ſometime after becomes enlarged, and if preſſed upon with the finger, is proved to be evidently in a ſtate of œdema.

Let us inquire what operations have taken place to which we can refer theſe effects.—It is evident, that the return of venous blood was firſt impeded by preſſure, and that a reſiſtance was formed to the action of the arteries, the ordinary efforts of which are now become inſufficient to propel the blood with its wonted velocity; hence a ne-neceſſity for greater exertion of the arterial ſyſtem to ſurmount the difficulty: but as the exhalants form a part of this ſyſtem, and partake of the general effect, an effuſion of their watery contents follows as a conſequence; hence the œdema, or in other words, a local dropſy.

The production of the effect juſt ſtated, does not argue or ſuppoſe any previous diſeaſe either in the exhalants or abſorbents, but ariſes from the concurring operation of two cauſes, (viz.) an impediment to the return of venous blood, and the conſequent accelerated action of the capillary and exhalant ſyſtems. And it ought further to be remarked, that as the remote cauſe was limited to a particular part of the body, ſo is the effect produced by it.

Let us now transfer this reaſoning to the liver, and ſee how far an impediment to the free paſſage of blood, through that organ, may operate towards the production of aſcites.

That ſtate of the liver, which more particularly diſpoſes to this diſeaſe, is the ſcirrous or indurared one:—that which, when examined by making ſlices of it, manifeſts a ſolid and cloſely compacted maſs, as if there had been depoſited interſtitially within its ſubſtance, ſolid matter ſufficient to deſtroy its parenchymatous character. Indeed the fact ſeems very evident, that its veſſels are leſs pervious, and conſequently, that the blood cannot be tranſmitted by them ſo freely as in a ſtate of health.

Now in a former part of this work, we endeavoured to make it probable, that the indurated or ſcirrous condition of the liver depended more on a diſeaſed action of the vena portarum than of the arterial ſyſtem of this gland; and that when an inflammation aroſe in this way, it was to be regarded rather as of the paſſive than of the active kind; or a ſpecies but little diſpoſed to terminate in a ſuppuration. Its effects are rather thoſe that characterize indolent parts, ſuch as induration, ſcirrhoſity, &c. But this conſequence neceſſarily enſues, that though venous inflammation has not activity enough to produce pus, it has power to effuſe the coagulable lymph of the blood into the interſtitial parts of the liver, and thereby diminiſh the capacities of the blood-veſſels, more eſpecially of the vena portarum; and thus an impediment to the free paſſage of blood through that ſyſtem is formed.

Having thus ſhown the probability of an obſtruction exiſting to the paſſage of the blood through the liver, in what manner does this bear a reſemblance to the effects of a ligature on the principal vein of an extremity?

Before we can anſwer this queſtion, we muſt recall to the attention of our readers what has been ſaid in a former part of this work on the ſubject, relative to the circulation of blood through the chylopoietic organs. There it was remarked, that the blood which had circulated through the ſtomach and inteſtines, omentum, ſpleen, and pancreas, and we may likewiſe add, the peritoneal covering of theſe viſcera, was returned to the heart by the intervention of the vena portarum: therefore it follows, that the circulation of blood through the liver ſtands in the ſame relation to the peritoneal viſcera, as the returning blood in the principal vein of an extremity does to that particular limb; and likewiſe it muſt follow of neceſſity, that whenever the liver is affected with any conſiderable degree of ſcirrhoſity, the circulation through the vena portarum will receive ſome interruption. That interruption, in whatever degree it may exiſt, muſt excite the capillary veſſels and exhalants of the peritonæal viſcera to greater action; and the effuſion of ſerum or lymph from thoſe parts follows as a conſequence. Such appears to me to be a rational explanation of aſcites, as founded on a ſcirrhous affection of the liver.

On the ſame principle may be explained the hydrothorax, as originating in the excitement of inflammation in the cavity of the cheſt; or in any mechanical obſtacle to the free paſſage of the blood from one ſide of the heart to the other, or from the preſſure on the diaphragm ariſing from an enlarged liver, or an aſcitic dropſy. This is the morbid ſtructure of the liver, which generally terminates in aſcites.

54. BUT there is an appearance ſometimes met with on diſſection, that is perhaps a little difficult to explain on this ſyſtem of reaſoning—this is, a tubercular ſtate of the ſubſtance of this organ, conſiſting of a ſeries of circumſcribed inflammations, interſperſed through the apparent healthy ſubſtance of it. Now it may ſeem a little difficult to underſtand how an accelerated circulation through the whole ſubſtance of the liver can produce effects ſo partial and circumſcribed. But the difficulty is no greater in this caſe than in

any other of local inflammation. Do we not ſee, continually, inſtances of circumſcribed inflammations and abſceſſes, where the ſtate of the circumjacent parts is natural and healthy? Such phænomena do not tend to diſprove the principles we wiſh to eſtabliſh; but ſhew, that the diſeaſed condition of veſſels we have before pointed at, may exiſt in a number of ſmall parts of any organ, while the greater part of its bulk ſhall be in a natural ſtate; or, that there may exiſt a conſiderable number of ſtimulating cauſes in the ſubſtance of the liver, each having its own ſphere of action, and each limited in its extent.

55. THE explanation juſt given is not offered as the mere ſuggeſtion of

theory, but admits of a degree of probability approaching to demonſtration. This laſt opinion ſeems ſtrongly ſupported by the reſult of an experiment that was made for the purpoſe of inveſtigating a point in phyſiology, not connected with the preſent queſtion.

EXPERIMENT.

56. Two drachms of crude mercury were injected, by means of a proper apparatus, into the crural vein of a dog. It produced no effects that were obvious for at leaſt a whole day; but afterwards, there were evident marks of in-

creaſed action in the vaſcular ſyſtem, attended with a quick and hard pulſe. After he had continued in this ſtate two or three days, a dyſpnœa ſupervened; this was ſoon followed by a cough, and ſymptoms evidently denoting an affection of the lungs, which daily increaſed until he died. His lungs, on examination, were found in a tubercular ſtate; many of theſe tubercles had ſuppurated and formed vomicæ.

57. THE queſtion here is, whether theſe tubercles and vomicæ aroſe from the introduction of the mercury?

The anſwer is very clear. The animal was in perfect health before. This, however, is only a preſumptive evidence.

But a minute examination of the tubercles, put the matter out of doubt; for on making ſections into the ſubſtance of them, each contained a globule of mercury, forming a kind of nucleus to the circumſcribed inflammation or tubercle. Whether theſe mercurial globules acted on the principle of ſimple ſtimuli, or in a ſpecific way, is not a ſubject for our preſent inveſtigation: but the inference intended to be drawn is, that ſymptoms of general excitement may exiſt in the whole body, and that only a particular organ may ſhow marks of diſeaſe; and further, that the circulation may be accelerated through all the veſſels of an organ, while only particular parts of that organ ſuffer a viſible alteration in their ſtructure.

58. Now it is natural to refer theſe appearances to ſome local cauſe, but which is not always ſo evident as in the experiment juſt recited. This cauſe may conſiſt in local alterations in the tone of the veſſels in particular parts of an organ; ſo that, in conſequence of an accelerated circulation through its whole ſubſtance, theſe debilitated parts may readily fall into a ſtate of chronic inflammation.

59. In conſidering the active and indolent inflammations of the liver, we have referred the former to the hepatic artery or nutrient veſſel; while the

latter has been conſidered as an affection of its ſecretory veſſel. As this opinion is not taken up on the ground of mere conjecture, it will not be out of place here, to aſſign a reaſon for having adopted it.

60. When we ſtate that chronic inflammations of the liver appear to be connected with its ſecretory office, we do not mean to reſt the explanation on any thing ſpecific in its ſecretory energy, but on its peculiarity of having the ſecretion effected from venous inſtead of arterial blood.

61. It is a fact well eſtabliſhed in phyſiology, that the living power or energy of any organ is, cæteris paribus, in proportion to the quantity of arterial

blood that circulates through it. There is ſomething then in the condition of arterial blood, that fits an organ, for active and vigorous purpoſes; the proofs of this poſition are ſo numerous, that they muſt occur to every one. Now when we recollect, that by far the greater portion of blood which paſſes through the liver is of the venous kind, and when it is remembered likewiſe, that this is leſs fitted to active purpoſes than arterial blood, there will appear ſufficient grounds for believing, that chronic inflammations of the liver are to be referred to the vena portarum, while thoſe of the active kind are imputable to the hepatic artery.

62. In the active and acute inflam-

mation of the liver, as well as that of other organs, the antiphlogiſtic practice ſhould be adopted; and as the attention of the practitioner ſhould be directed to the prevention of ſuppuration, he muſt be guided by the circumſtances of each individual caſe in forming his judgment to what extent that practice may be purſued. Here much depends on his diſcernment, as well reſpecting the extent of the antiphlogiſtic practice, as in determining the preciſe period when it is likely to be moſt uſeful: for it muſt be obvious, that if any conſiderable advantage is to be expected from this practice, it muſt be looked for in an early ſtage of the diſeaſe, when the inflammation has not advanced beyond the probability of reſolution.

63. The more prominent part of the antiphlogiſtic treatment is blood-letting: the quantity of blood to be taken away, together with the propriety of repeating that operation, can be judged of only by the violence of ſymptoms, by the effect upon the pulſe, and by the circumſtances of each individual caſe.

64. Blisters, applied to the region of the liver, co-operate very ſtrongly with the views of blood-letting, and therefore, in attempting reſolution, recourſe ſhould be had to them very early; and here again the ſame diſcrimination is neceſſary with reſpect to their dura-

tion and repetition, as was required in the caſe of blood-letting. It has been advanced by ſome, and experiment appears to have juſtified the poſition, that a quick ſucceſſion of bliſters to the vicinity of an inflamed organ, prevails more over the activity of inflammation, than the long protracted diſcharges from a ſingle veſication. My own experience having abundantly confirmed the truth of this doctrine, I cannot recommend it to the practitioner in too ſtrong terms.

65. As ſubſervient to the intention of reſolution, medicines promoting alvine evacuations are highly expedient; for this purpoſe, thoſe which are of a ſaline nature appear to me to claim a preference; and perhaps it is adding

not a little to their efficacy, to exhibit them in a diluted form, in which ſtate they not only ſeem to be more ſtrictly antiphlogiſtic, but are leſs liable to occaſion nauſea, and other diſagreeable ſenſations in the ſtomach.

66. In blood-letting, bliſters, and laxative medicines, appear to conſiſt the more eſſential parts of antiphlogiſtic practice; but there are other reſources of which we can avail ourſelves, and which, though ſubordinate in point of activity, are found from practice to be very efficacious as auxiliaries. Under this head we may rank antimonials, exhibited in ſuch doſes as may tend to produce and continue a degree of ſoftneſs and moiſture upon the ſkin; and

this operation of antimonials is much aided by a free and plentiful uſe of diluting liquors, of which there is an endleſs variety.

67. By the means above recited, the practitioner, if called in at the commencement of the diſeaſe, will generally be able to check every tendency to the ſuppurative proceſs.

68. In warm climates, more eſpecially in the Eaſt Indies, where hepatitis may be regarded as the endemia of the country, the tendency to run on into the ſuppuratory proceſs is ſo great, as ſcarcely to be reſiſted even by the moſt active practice; therefore, if an early and vigorous purſuit of the antiphlogiſtic plan of treatment be neceſſary in this

country, where the courſe of the diſeaſe is comparatively moderate; the extenſion of ſuch treatment to the utmoſt limits of prudence, becomes expedient, if we would oppoſe with ſucceſs the rapidity of its progreſs.*

69. If, either from an unuſual violence of the diſeaſe, the too late application for medicinal aſſiſtance, or the unavailing effects of the antiphlogiſtic plan of treatment, the inflammation ſhall have proceeded to the ſuppurative ſtage, different phænomena occur, according to the particular part of the liver in which the ſuppuration is ſeated.

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* See Mr. Chriſtie's Letter to the Author, in the Medical and Phyſical Journal, vol. 2. p. 4. in which the frequency, violence, and rapidity of the diſeaſe among Europeans newly arrived in India, is particularly pointed out.

Theſe phænomena are ſuch as ariſe out of the laws which regulate the opening of abſceſſes: for, the operation of nature in this reſpect, as well as in moſt others, is regular and uniform.

70. From obſervation we learn, that ſometimes hepatic abſceſſes open ſpontaneouſly into the inteſtinal canal, in the manner explained at ſome length in a former part of this work; at others, they make their way through the diaphragm into the air cells of the lungs, from whence the matter is diſcharged by expectoration; or, an adheſion takes place between the anterior ſurface of the liver and the parietes of the abdomen, allowing the pus to make its eſcape by the common integuments.

71. Each of theſe channels of diſcharge is determined very much by the particular ſeat of the abſceſs. When the poſterior or concave ſurface is concerned, the matter uſually paſſes off by ſome part of the inteſtinal canal, frequently the duodenum; but when it is ſeated towards the inferior edge, the colon offers a readier outlet. When the ſuperior portion ſuppurates, the air cells of the lungs favour the eſcape; and ſuch abſceſſes as form towards the anterior ſurface, uſually extend themſelves to the integuments, through which they diſcharge their contents, either ſpontaneouſly, or by the aid of chirurgical means.

72. The intention of nature in re-

lieving herſelf by theſe different channels is the ſame, as ſhe is guided by one common principle in all of them, viz. that of availing herſelf of the readieſt outlet. But experience has evinced, that theſe are not all equally favourable to her ultimate views; and ſome hepatic abſceſſes, which have been diſcharged by the lungs, appear to have produced their fatal effects more from an extenſion of ſuch abſceſſes into the ſubſtance of theſe organs, than from any derangement the conſtitution had ſuſtained from the affection of the liver. I feel myſelf warranted the more in maintaining this idea, not only from having repeatedly ſeen the ſymptoms of hepatitis, in its latter ſtage, evidently transformed into the characters of peripneumony; but from having aſcertained, by examination after death, that a ſuppurative ſurface, which originated in the liver, extended itſelf into the ſubſtance of the lungs in ſuch a degree, as clearly to explain the cauſe of the peripneumonic ſymptoms.

73. The diſcharge of hepatic abſceſſes, either by the inteſtines or the abdominal ſurface, is much preferable; as in the former, the organ, though important and even vital, is affected only to a ſmall extent; and in the latter, very little danger can ariſe from an opening of a moderate ſize. What occaſions our ſurprize is, that they ſeldom effuſe their contents into the cavity

of the abdomen. The law itſelf is wonderful, though the means by which nature carries her intentions into effect are very obvious; for in all theſe caſes the opening is ſurrounded by adheſions ſo effectually, that there is little danger of the general cavity being expoſed.

74. IF, however, the diſeaſe is well marked, and the abſceſs has pointed to a determined part of the integuments, we need not wait for a ſpontaneous opening, but by means of a lancet may diſcharge the matter. Such abſceſſes are ſeldom in haſte to heal, nor is it deſirable, until the cavity of the abſceſs ſhall have been filled up by healthy granulations. During this proceſs, which is ſometimes tedious, the health

gradually returns; and I have had experience of caſes, where the diſcharge accompanying this granulating operation was continued for years, during which time the health was in a progreſſive ſtate of amendment, and at length was perfectly eſtabliſhed.

75. SUCH inſtances, though ſurpriſing, are not myſterious, for a part only of the liver has been concerned in the abſceſs. During the period of active inflammation, the conſtitution partook of the effects, perhaps, more from a principle of ſympathy with the inflamed organ, than from any derangement in its economy as a gland; and therefore it is natural to expect, that, as the

inflammatory ſymptoms ſubſided, the ſigns of health ſhould return.

76. AN opinion has for ſome time prevailed, that mercury is a ſpecific in every diſeaſe of the liver; and that even in active phlegmonous inflammations it will obviate ſuppuration. This opinion appears to have been founded on an idea, that there is ſomething very peculiar in the inflammation of the liver that is not met with in any other organ.

77. IT is true, that in conſidering its glandular office, it affords an exception to the law of glands, in having its ſecretion performed from venous blood; and this we have already conſidered as having a connexion with

chronic inflammation, which experience has ſhown to be relievable by mercury. The ſucceſs in theſe caſes has perhaps led to an empirical practice, and due diſcrimination may not always have been made between inflammations of a more indolent, and ſuch as are of a more active nature.

78. To exhibit a remedy without due diſcrimination is to abuſe it, and at length to bring it into neglect; and in this way the world has been deprived, for a time, of the benefit of ſome of the moſt valuable articles of the materia medica, which, however, have been reſtored to them afterwards, on the recommendation of men of candour and ability, after having determined their

true value by repeated and judicious exhibition.

79. PERHAPS the ſame fate may await the uſe of mercury in complaints of the liver, if, by a blind empirical adminiſtration of it, it be incautiouſly employed in the active periods of inflammation, when, from its ſtimulant properties, it appears better calculated to accelerate, than to retard the ſuppurative proceſs.

80. IT is very probable, that the attachment of the practitioners in warm climates to the early uſe of mercury, may have ariſen in part from the great debility conſequent on the previous excitement of the ſyſtem, which debility is ſuppoſed to prevail the moſt, where

there had been much evacuation; and this prejudice has perhaps been carried to a dangerous extreme. But there are not wanting ſome, who are perfectly aware of the neceſſity of proper diſtinctions, and who pay due regard to them in their practice.

81. In the Eaſt Indies, where this complaint is endemic, I am informed, on the beſt authority, that many judicious and ſucceſsful practitioners ſeldom adminiſter mercury until the violence of the inflammatory action has been moderated by bleeding, active purging, and the antiphlogiſtic plan of treatment. Then it is, that mercury is employed to the greateſt advantage. But it appears on attentive obſervation, that the

tranſition of active inflammation into a ſtate of reſolution, is not immediately followed by a healthy condition of the part, but it remains for a time debilitated, and diſpoſed to lapſe into a chronic ſtate. This will probably be found the proper period for the exhibition of mercury, which acts as a ſpur on the vaſcular ſyſtem of this organ, and by its moderately ſtimulating effects, occaſions a degree of action, which, when protracted to a proper length, terminates in health.*

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* The following remarks were communicated by my particular friend, Dr. JAMES CURRY, Phyſician to GUY'S HOSPITAL, who having been in India in 1786-7, and ſince that time practiſed in this country, may be conſidered as having had a better opportunity of comparing the nature and treatment of the diſeaſe, than falls to the lot of many.

82. But the diſpoſition of hepatitis to terminate in a ſcirrhous and diſeaſed ſtructure, either of the whole, or of a

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" The obſervations in par. 76-81, on the employment of mercury in acute hepatitis, are extremely juſt, as far as reſpects its operation on the ſyſtem at large; which is the view uſually taken of the remedy in hepatic affections whatever their nature may be. But, from the general and comprehenſive term *mercury*, an exception muſt be made in favour of calomel, in acute inflammation of the liver. Indeed when we conſider the violence and rapidity of the diſorder in many inſtances, it does not ſeem poſſible to excite a general mercurial action, ſufficiently ſoon to overtake and arreſt its progreſs; and if it were, it would not appear adviſeable to make the attempt, leſt the ſuddenneſs and violence of ſuch action might ultimately be productive of greater miſchief than would attend the original diſeaſe under any other mode of treatment. From this objection, however, calomel is entirely free; as the good effects from it may be obtained not only more ſpeedily than in the other way, but without occaſioning any *general* operation, and, conſequently, without that injury which certain conſtitutions experience from mercury when carried to that degree.

Whether from the greater tone of fibre in temperate and cold, than in hot climates,—from the increaſed part of the liver, is ſo ſtrong in ſome caſes, as not to be reſiſted by a moderate mercurial action. Here we are to take

action of the liver as a *ſecretory* organ in theſe laſt,—or from both of theſe circumſtances,—certain it is, that hepatitis in Europe partakes much more of the nature of ſimple inflammation, than hepatitis in India; and of courſe, the ſimple antiphlogiſtic plan of cure will of itſelf be oftener ſucceſsful in the former than in the latter variety of the diſeaſe. From my own practice, however, in this country, as well as from comparing it with that of others, I am as firmly convinced as I can be of any medical fact, that, by the early and free adminiſtration of calomel, I have ſaved many a pound of blood which muſt otherwiſe have been taken away, to alleviate the urgent ſymptoms of hepatic inflammation. In proof of this I could adduce a great number of caſes; but ſome have occurred to me lately, both in the Hoſpital and in private practice, which are particularly illuſtrative of the benefit derived from calomel in all inflammatory affections in which the liver is any wiſe concerned;—as in the caſes alluded to, from the pain being ſeated in the *left* ſide of the thorax, and no ſymptom preſent which clearly indicated hepatic affection, they were at firſt conſidered as peripneumonic or pleuritic, and treated accordingly, by local and general the advantage of its more active operations; and, inſtead of inducing a ſlight change upon the pulſe, with only a

blood-letting, purging with infuſion of ſenna, bliſters to the part, and the uſe of antimonial diaphoretics. Notwithſtanding theſe remedies, however, no conſiderable or permanent relief was obtained, until their failure led me to ſuſpect, that the *liver* was the primary ſeat of the complaint, and the remote thoracic pain only ſymptomatic. Upon this impreſſion, I immediately put in practice the mode which I had before employed with ſucceſs in obvious caſes of hepatic inflammation,—of giving three or four grains of calomel every four or ſix hours, as the urgency of the ſymptoms required;—and with the effect of entirely removing the pain and difficulty of breathing in the courſe of the night.

As in moſt other caſes, calomel given in ſuch doſes and at ſuch intervals proves conſiderably purgative, it might be concluded, that its good effects here were entirely owing to its cathartic power. This is in a great meaſure true, but is ſo only in a particular ſenſe of the term *cathartic*, and therefore requires explanation. The bowels may be repeatedly cleared by other purgatives without much relief; and even calomel is often attended with little if any more advantage, if it paſs very ſpeedily through the inteſtines. The mode in which alone it tendernefs of the mouth, we ought to extend its effects to the production of a gentle falivation, which, when continued

proves effectual, is, by emulging the biliary ducts; and the evidence and meafure of its falutary operation is, the quantity of bile which it evacuates by ftool. Though its effects then, be ultimately that of a cathartic, yet it is not fimply as fuch that it is ufeful, but by acting fpecifically, and being (if I may be allowed an antiquated expreffion) a *cholagogue*, or evacuant of bile. Why a medicine poffeffing fuch a property fhould be efpecially ferviceable in hepatitis, muft I think be pretty obvious; but if it fhould be thought to require illuftration, we have a very familiar one in the inftance of another glandular organ; I mean the female mamma. Practitioners have daily opportunity of feeing the immediate and great relief afforded by drawing out the milk where this gland becomes inflamed after lying-in, or during the period of lactation: indeed, in many cafes of inflamed breaft, little elfe is neceffary than emptying the lacteferous ducts at the beginning, and repeating it from time to time as the milk re-accumulates;—the inflammatory action of the veffels often fubfiding fpontaneoufly, when this caufe of diftention and irritation is removed. Though the means employed in hepatitis are neceffarily different, yet the effect is the fame;—the general diftenfion of the liver for a length of time, generally effects a cure.

83. In the exhibition of mercury for

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is leſſened by emulging it of its bile, which, at the ſame time that it is ſecreted in larger quantity from the increaſed action of the vena portæ, is prevented from paſſing freely into the duodenum, in conſequence of the hepatic and common ducts partaking of the inflammatory ſtate. The general cholagogue power of calomel, is well known to all thoſe who have practiſed in hot climates, and particularly in India; and it now begins to be admitted by practitioners in this country, who are attentive to its operation. But its having this effect in acute hepatitis, can only depend on its leſſening or removing in the firſt inſtance, that inflammatory conſtriction of the ducts which occaſions the bile to be retained in the liver; for (as I have already obſerved) other medicines, the general cathartic effect of which is much greater than calomel, are by no means of equal ſervice. It amounts, I think, to a proof of this opinion, that even calomel fails if it paſs through the bowels quickly; and that I have often been obliged to aſſiſt its relaxing power on the biliary ducts, by joining it with opium and antimonial powder, eſpecially the former, which I give to the amount of a grain or more every ſix hours, or as often as the urgency of the pain renders neceſſary. Under this management, I have this purpoſe, a preference has been given to friction; and the part on which the mercurial ointment has been rubbed, is

repeatedly found the urgent ſymptoms abate conſiderably, many hours before any alvine evacuation took place, and of courſe before the calomel could be ſaid to act as a cathartic: in ſome caſes too, where no evacuation followed, it became neceſſary to give cathartic medicines afterwards, in order to ſecure the relief which the calomel had procured, and to prevent the pain and dyſpnœa from returning; which they were apt to do, if the liver was not emptied while under the relaxing influence of the calomel and opium. It not unfrequently happens, that the ſtomach partakes ſo much of the inflammatory condition of the liver, and becomes in conſequence ſo extremely irritable, as to reject every thing by vomiting almoſt as ſoon as ſwallowed. In this ſtate of continual retching, which greatly aggravates the diſeaſe, and increaſes the pain almoſt to agony, the effervesſcing draughts, and other means uſually employed, were of no avail, nay even calomel united with opium, proved too irritating. Under theſe circumſtances, inſtead of the calomel in its ordinary ſtate, I have with the beſt effects preſcribed calomel, freed from its muriatic acid, by carefully triturating it with lime water; whereby it is converted into a dark ſlate-coloured oxyd, virtually the ſame with the Hydrargyrus præcipitatus cinereus the right hypochondrium, from a notion of its efficacy being greater when applied to the vicinity of the diſeaſed

of the Edin. Pharm. and with that formed in making Plinck's Solution, which you yourſelf firſt employed and recommended in this country. It is ſo much leſs irritating to the ſtomach and bowels than calomel, that when joined with opiates, it will be retained with eaſe; and the effects of it in allaying pain, retching, and other urgent ſymptoms in hepatic inflammation, have been often not leſs aſtoniſhing to myſelf, though long in the habit of uſing it, than to a number of gentlemen who have had an opportunity of inveſtigating a practice which was altogether new to them. This *local* mercurial operation of calomel is not ſolitary; we have a ſimilar inſtance of it in the effects which were obſerved to attend the practice recommended by the late Mr. Clare, for the cure of venereal complaints: by rubbing two or three grains of calomel upon the gums daily, the ſalivary glands were very quickly affected, and a ptyaliſm induced; while the ſyſtem was ſo little affected, that chancres either remained as before, or if they healed, ſoon broke out again.

I have had repeated opportunities of knowing that your practice exactly accords with what I have ſaid upon this ſubject; but I was induced to be more partiquently abſorb better than entire ſurfaces, and in many caſes ſuch artificial means of promoting abſorption may be admitted.—It is likewiſe a ſubject worth conſidering, whether ſtill greater advantage may not be derived from the introduction of the more active chemical preparations of mercury by abſorption, than by the uſe of the common mercurial ointment.—Ulcerated ſurfaces will abſorb the ſaline preparations of mercury, while a ſurface covered with a cuticle, would with difficulty admit them. The quantity of mercury at any one time in a ſtate of action in the body, is ſo ſmall, as to elude all the powers of chemical inquiry. In repeated trials with the moſt accurate teſts of various kinds, I have not been able to diſcover the leaſt trace of mercury in the ſecretions of perſons under ſalivation, either from the internal or external uſe of it.

85. THE ſcirrhoſity, which we have been conſidering as the remains of hepatitis, is often very intimately connected with other diſeaſes; and is thought, by men of obſervation and experience, to ſtand in relation to them as a cauſe. Thus in India, the fever and dyſentery, which are conſidered as the endemiæ of the country, have been found on diſſection, to be accompanied with diſeaſes of the liver. In ſome inſtances, the whole ſubſtance has been in a ſcirrhous ſtate; in others, abſceſſes and the uſual

appearances of hepatitis have been met with: the fact is certain, though the relation in which they are placed to each other may be matter of opinion.

86. If it be true, (and there can be but little room for doubt), that every diſeaſe of a gland muſt affect, in ſome degree or other, its ſecretory powers, we may admit, that the biliary ſecretion may become extremely vitiated, may acquire acrid properties, and may morbidly affect the inteſtinal canal by its paſſage through it; hence may follow ulcerations of the internal ſurface, giving riſe to the common ſymptoms of dyſentery. But if it be an eſtabliſhed fact, as has been aſſerted by high authority, that the dyſentery is always contagious,

there would ſeem to be a neceſſity for calling in ſome other principle of action, in addition to the acrimony of the bile. But waving this controverſy, which cannot be protracted to a greater length, without evidently digreſſing from the main purpoſe of this chapter, it is in place here to obſerve, that theſe dyſenteries are ſo far congenial to the hepatic affections with which they are combined, that they are generally relieved by mercury, adminiſtered under the cautions we have already laid down.

FINIS.

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organ, than to a diſtant part. But my opinion is, that, except in ſo far as friction may ſerve the place of gentle exerciſe to the part, and thereby aſſiſt in emulging the biliary ducts, there is no material advantage derived from this; and that it is of little importance, what part is made choice of, provided the effects produced on the general ſyſtem are equally ſtrong.

84. THE knowledge we derive from anatomy, reſpecting the ſtructure, origin, and direction of the lymphatic veſſels, ſufficiently proves, that neither by the internal uſe of mercury, nor by

---

cular in my detail, leſt thoſe who have not had ſuch advantage, might miſapprehend what you have ſaid reſpecting the uſe of mercury; and apply to *calomel* what was only meant with regard to mercury when employed ſo as to operate on the ſyſtem at large."

its external application, can any of it be made to paſs through the liver in its way into the conſtitution; it cannot, therefore, act on the liver, but by being firſt introduced into the blood-veſſels. It is ſometimes difficult in caſes of diſeaſed liver, eſpecially if attended with dropſy, to introduce mercury into the conſtitution; under ſuch circumſtances, the beſt abſorbing ſurface ſhould be employed for the purpoſe of friction; ſuch parts of the body as have the fineſt cuticle, as between the fingers, in the axilla, or groin, abſorb moſt readily, and if the cuticle be removed by bliſters, from any part of the body, ſuch a ſurface will be found beſt adapted to the purpoſe of abſorption. Ulcers fre-

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